

FIG.1

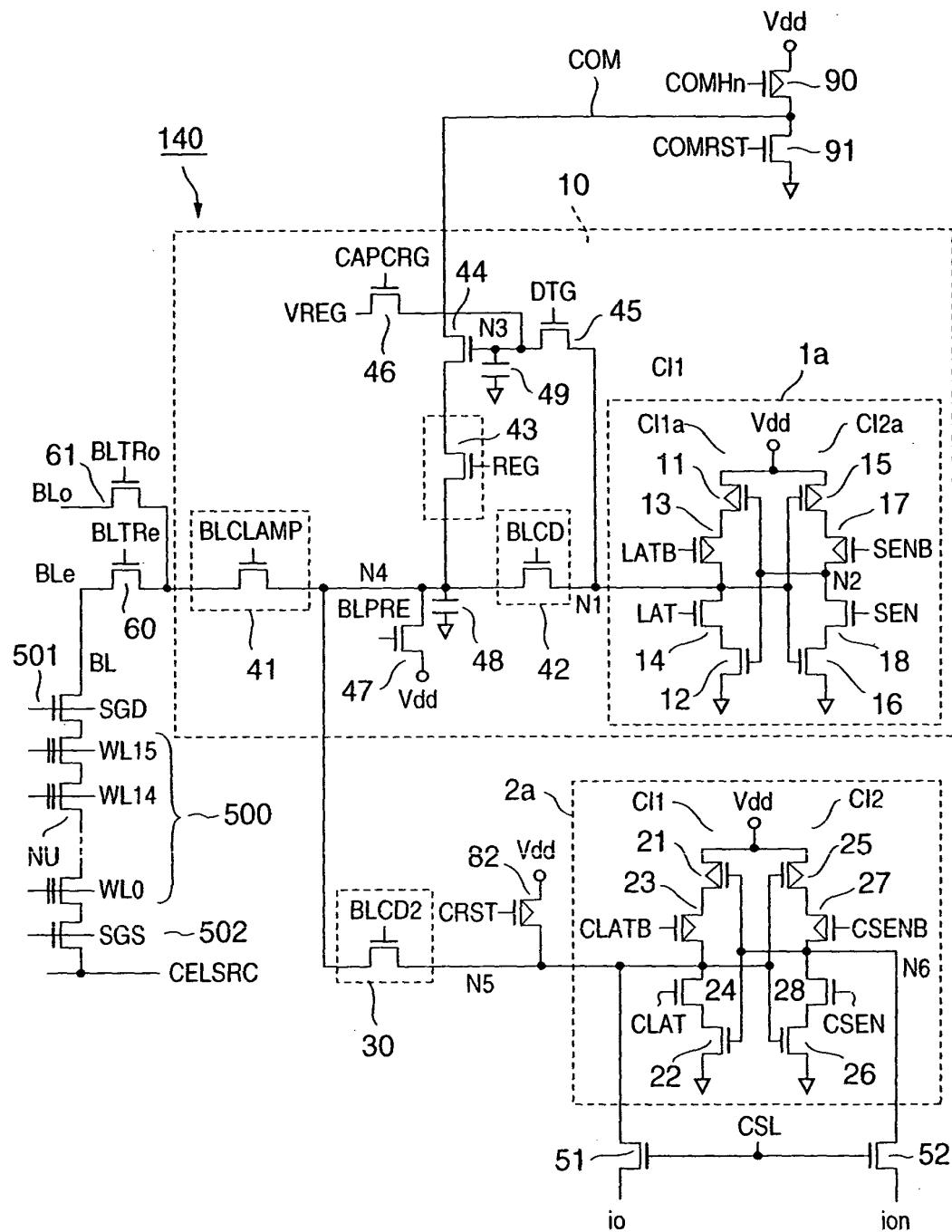


FIG.2

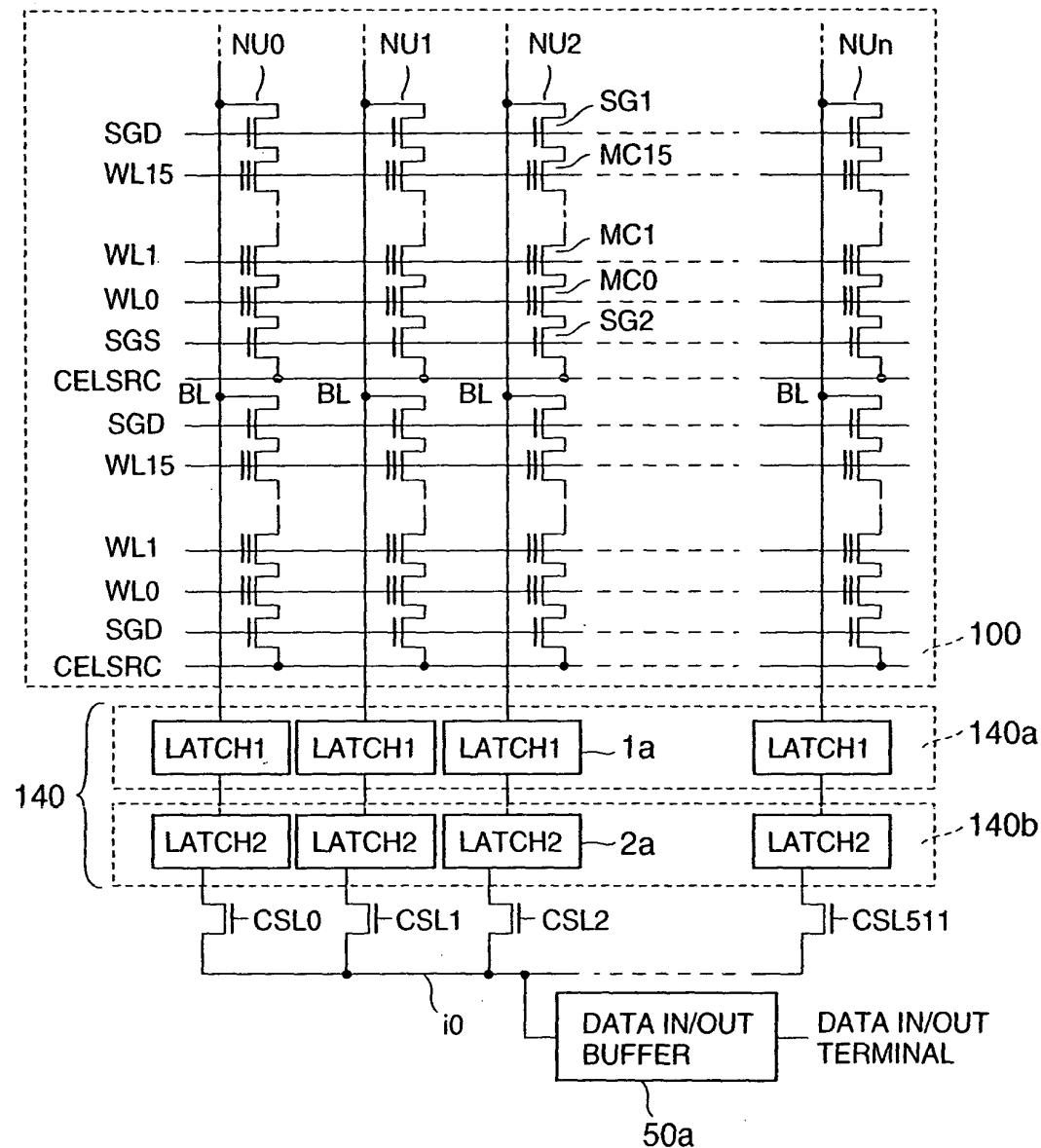


FIG.3

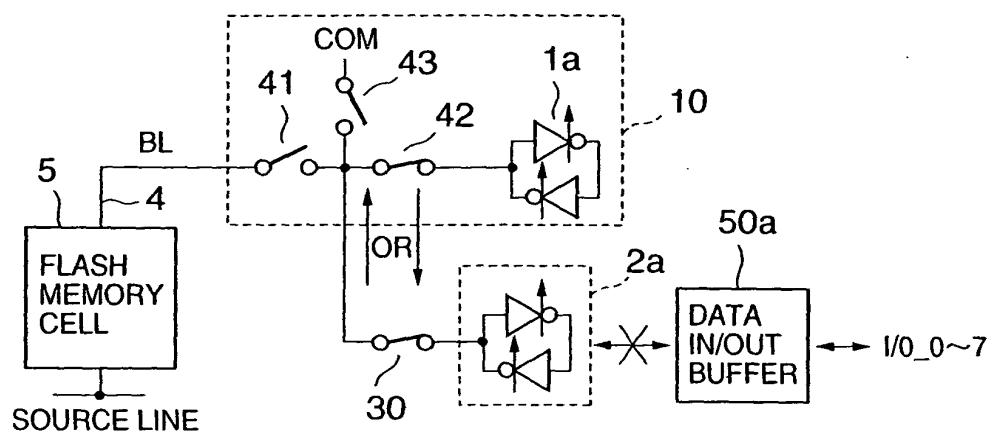


FIG.4

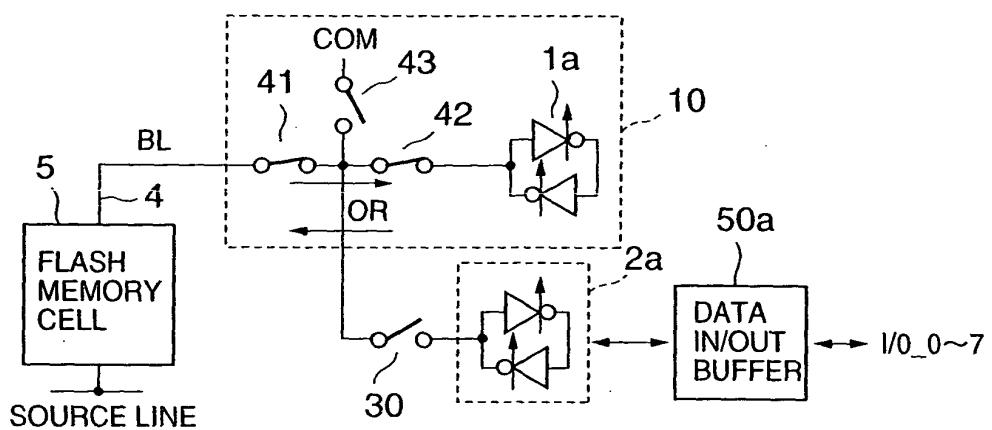


FIG.5

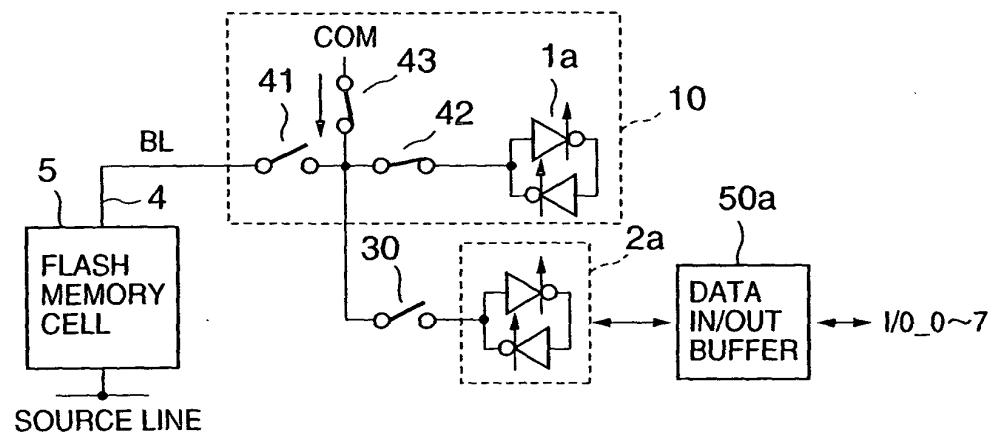


FIG.6

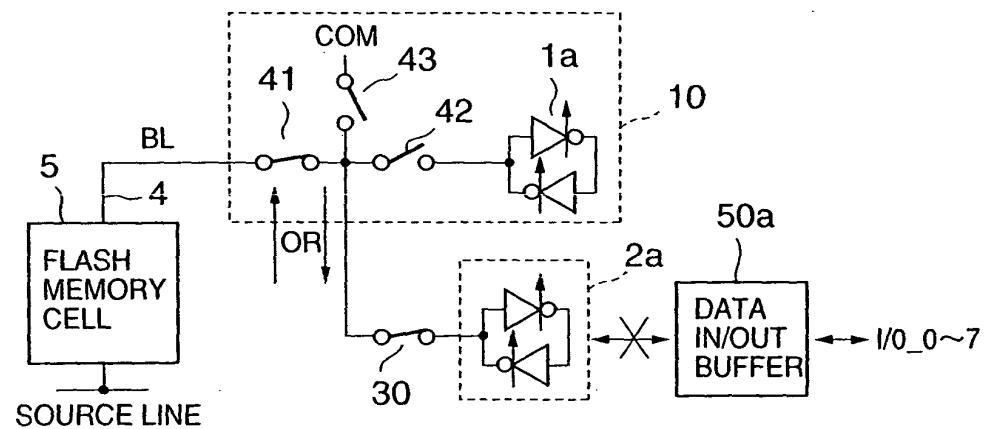


FIG.7

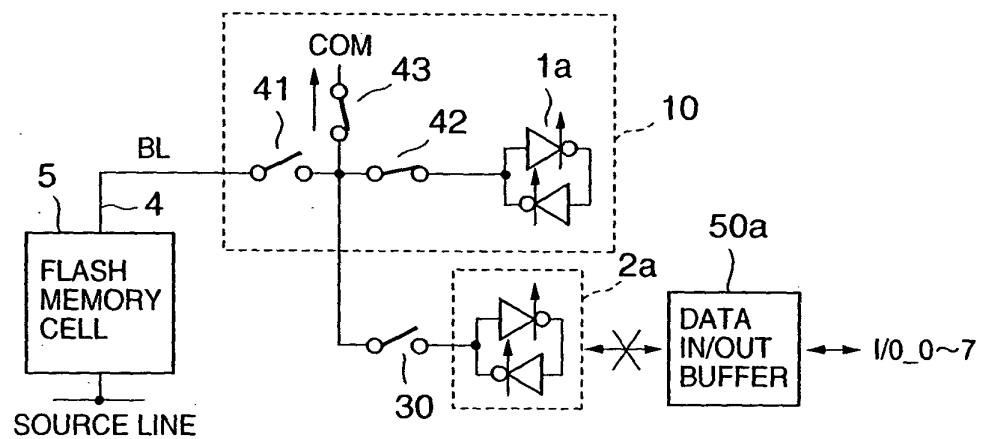


FIG.8

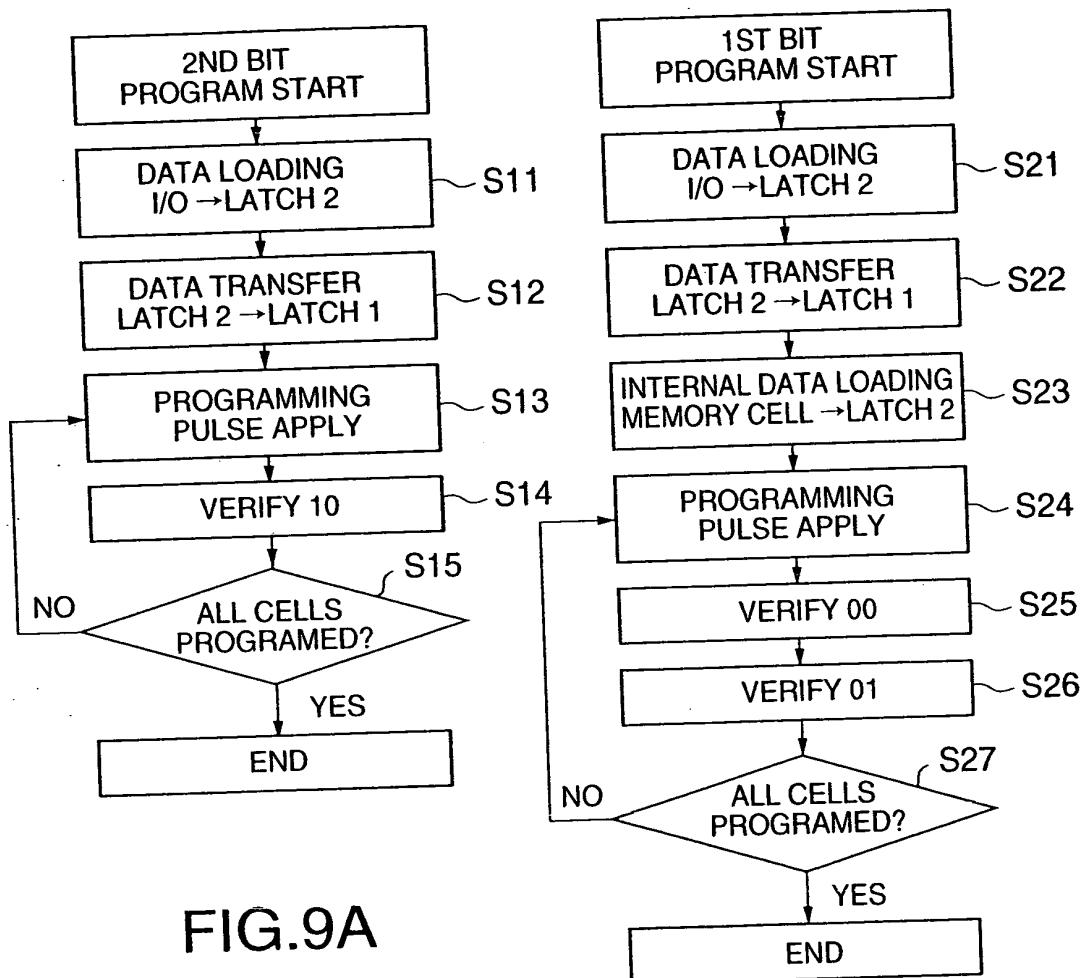


FIG.9A

FIG.9B

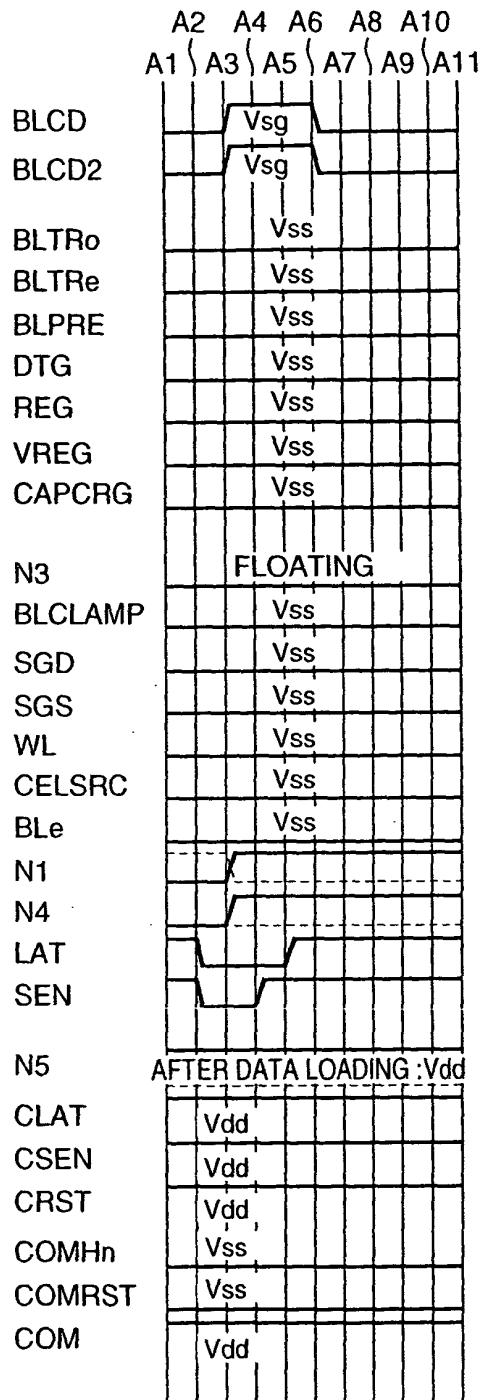


FIG.10A

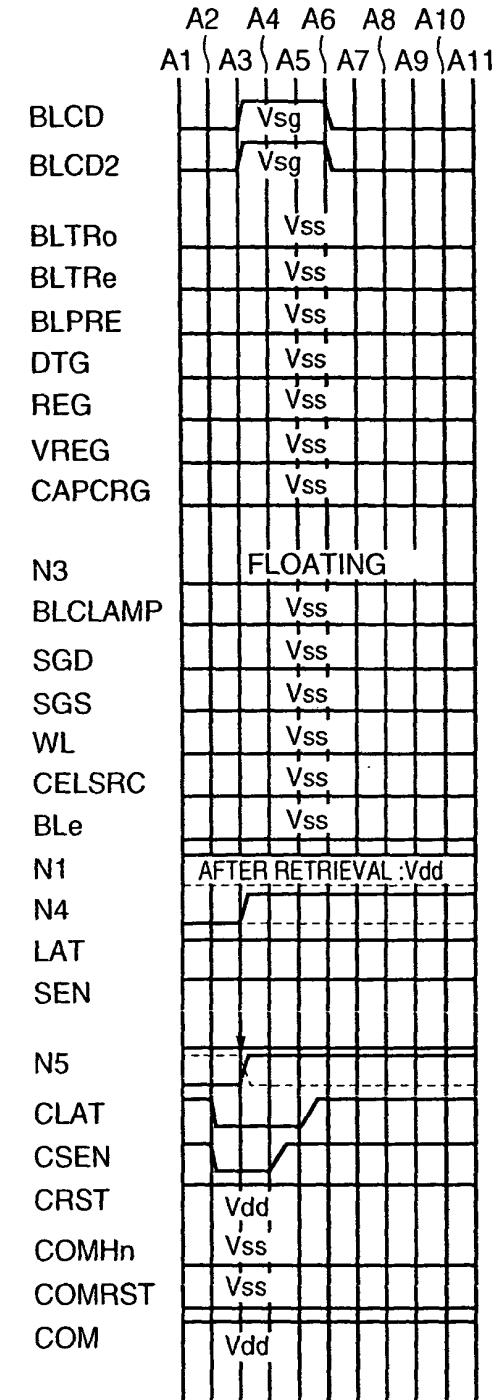


FIG.10B

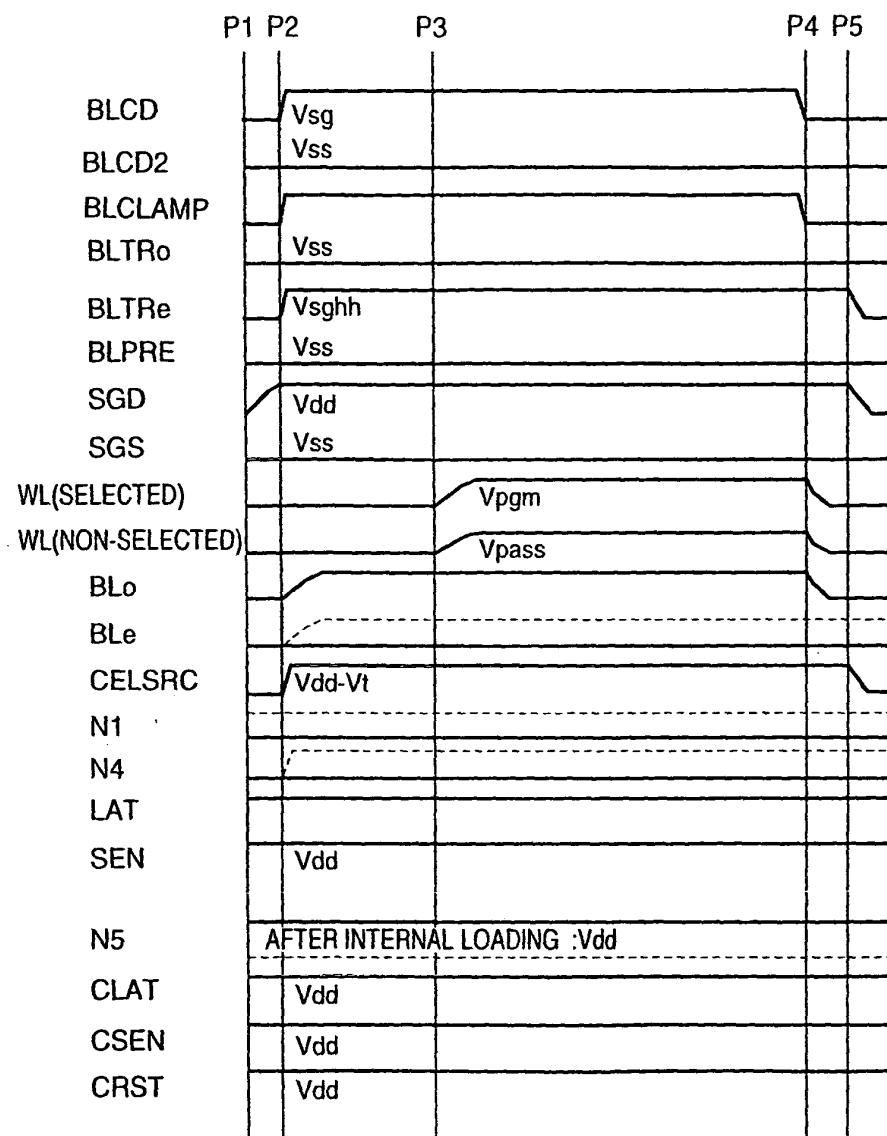


FIG.11

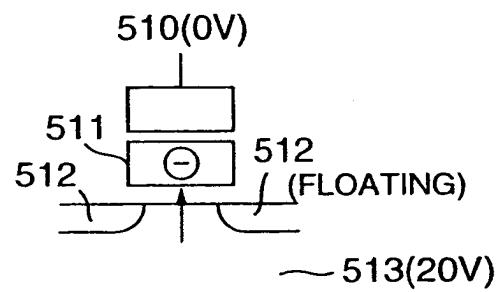


FIG.12A

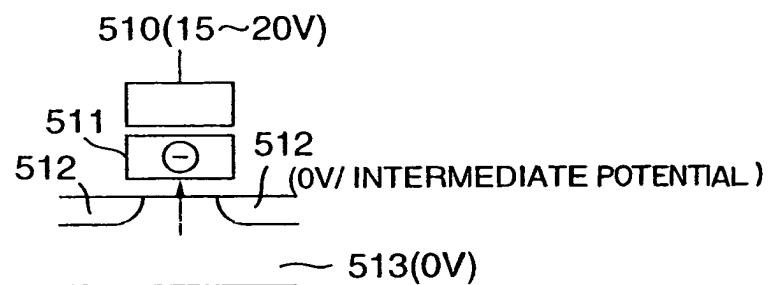


FIG.12B

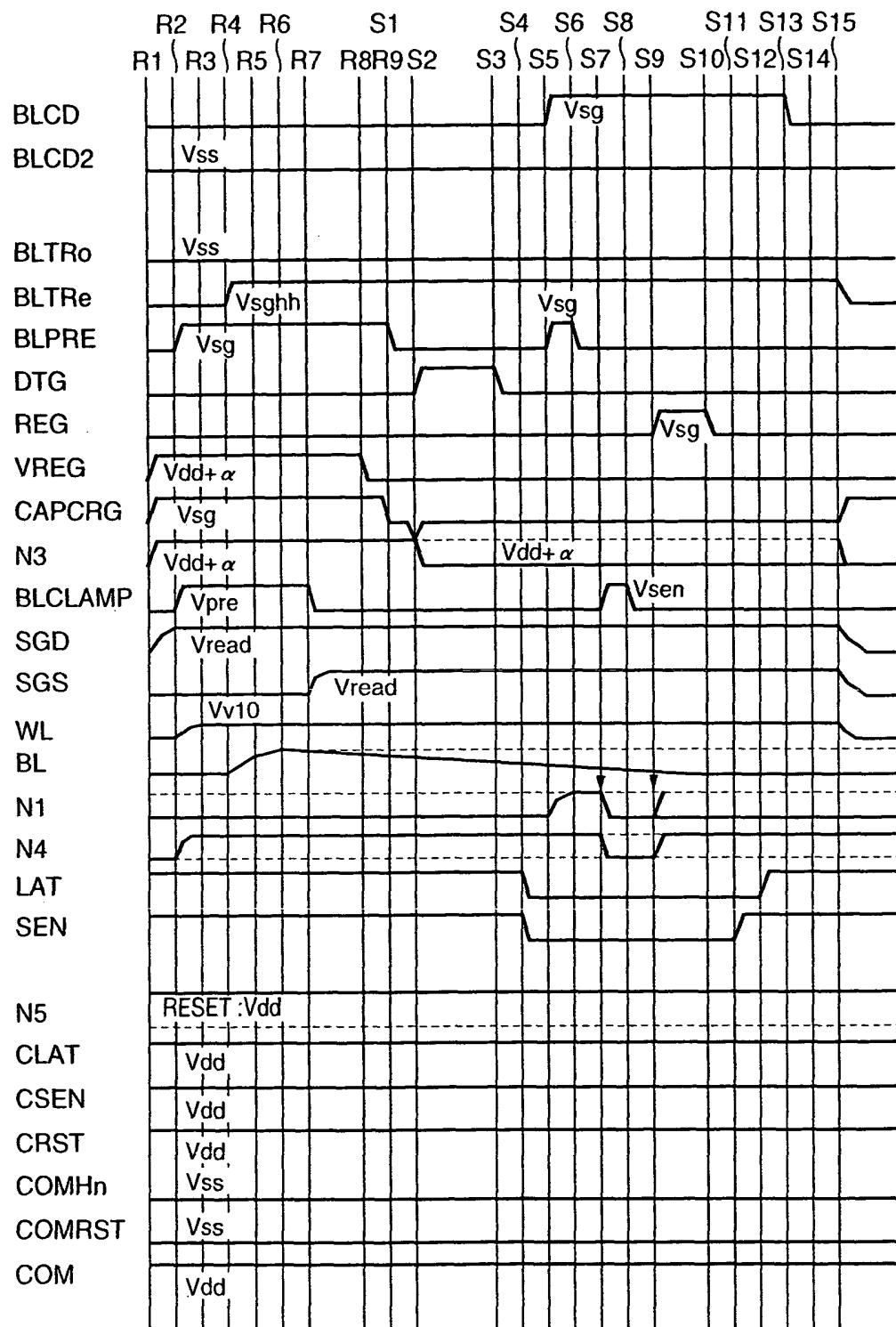


FIG.13

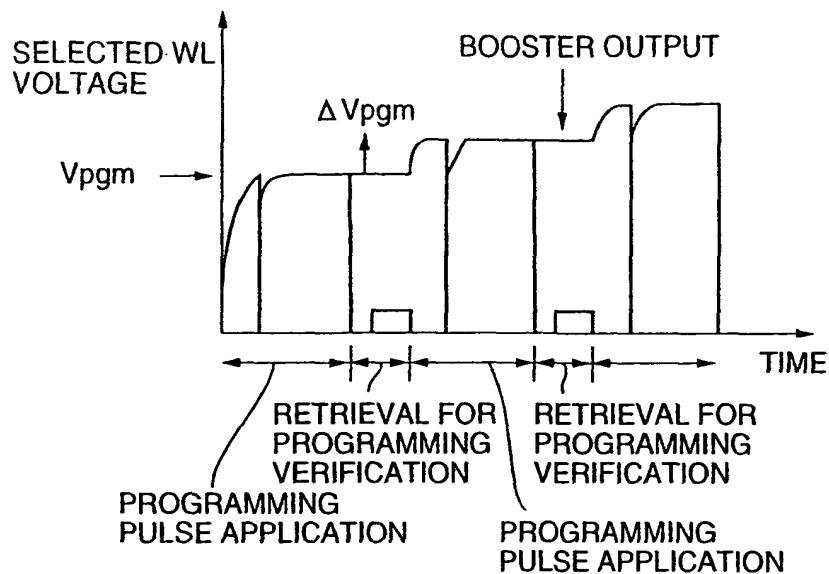


FIG.14

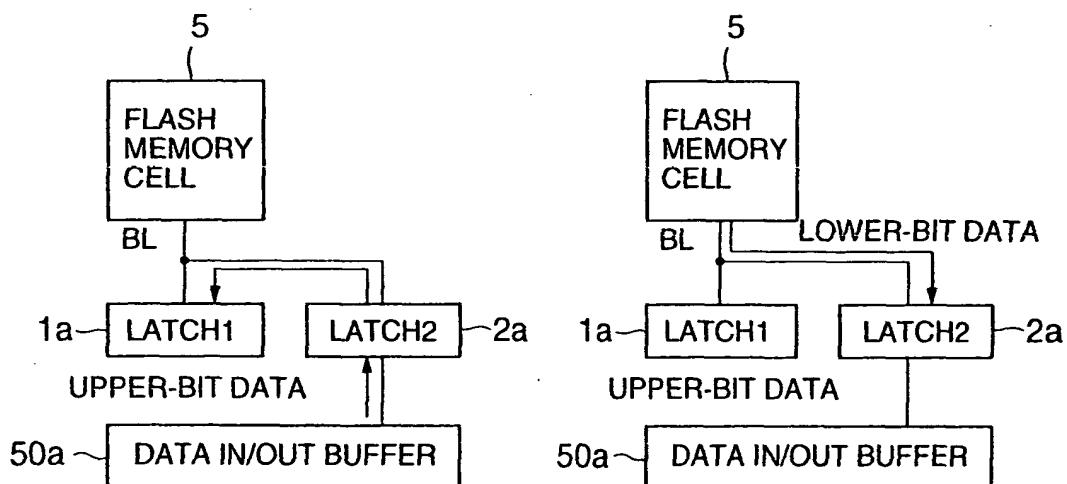


FIG.15A

FIG.15B

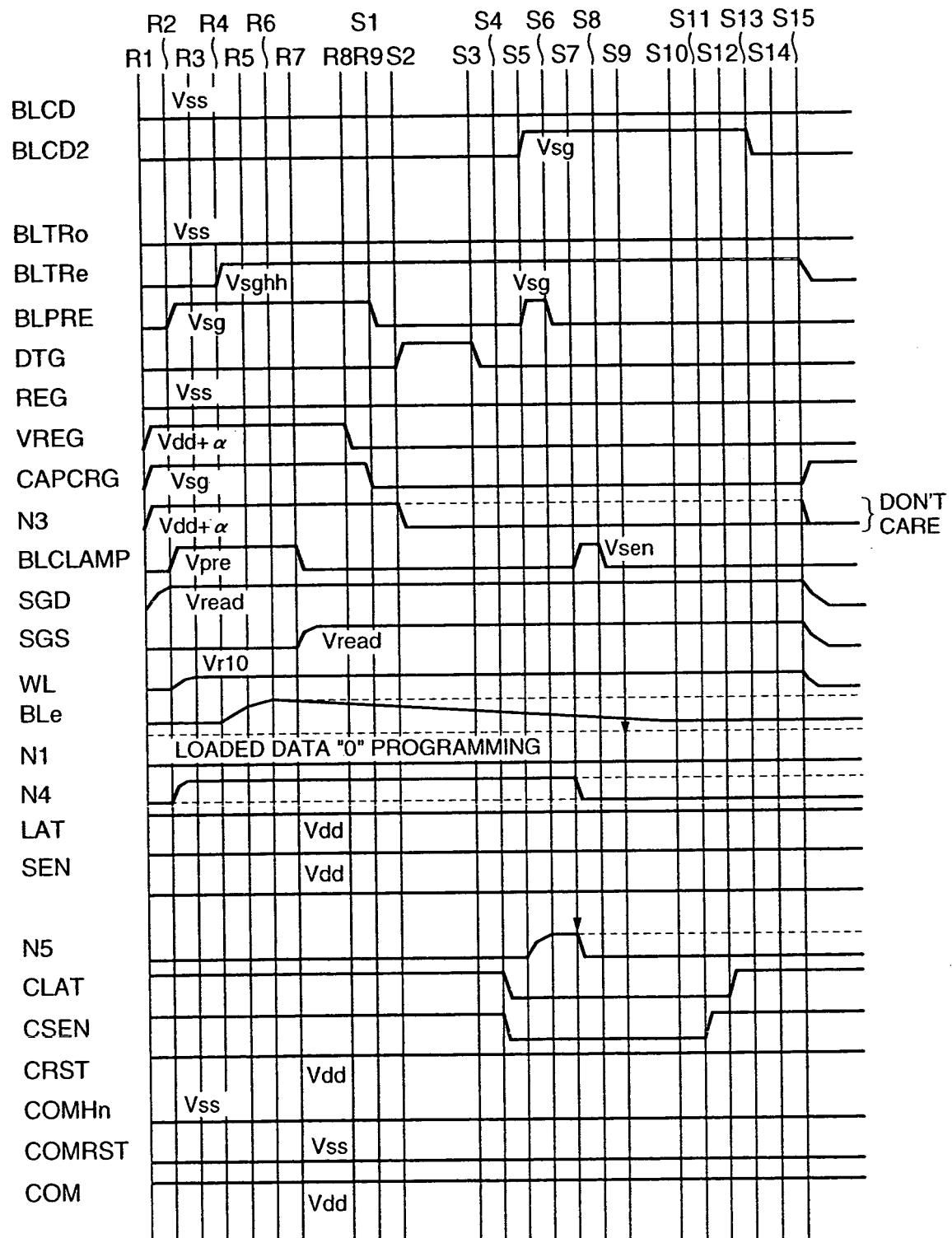


FIG.16

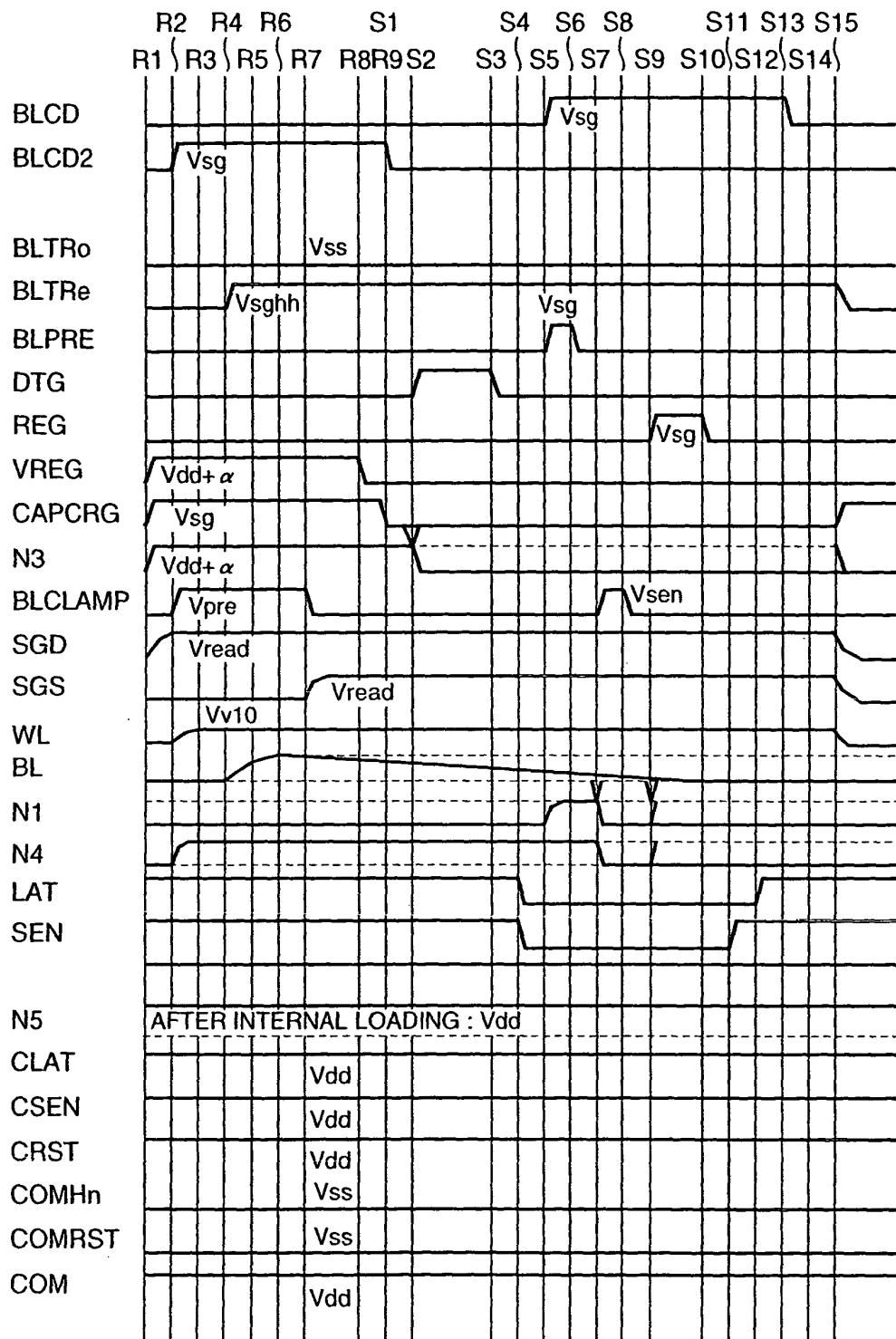


FIG.17

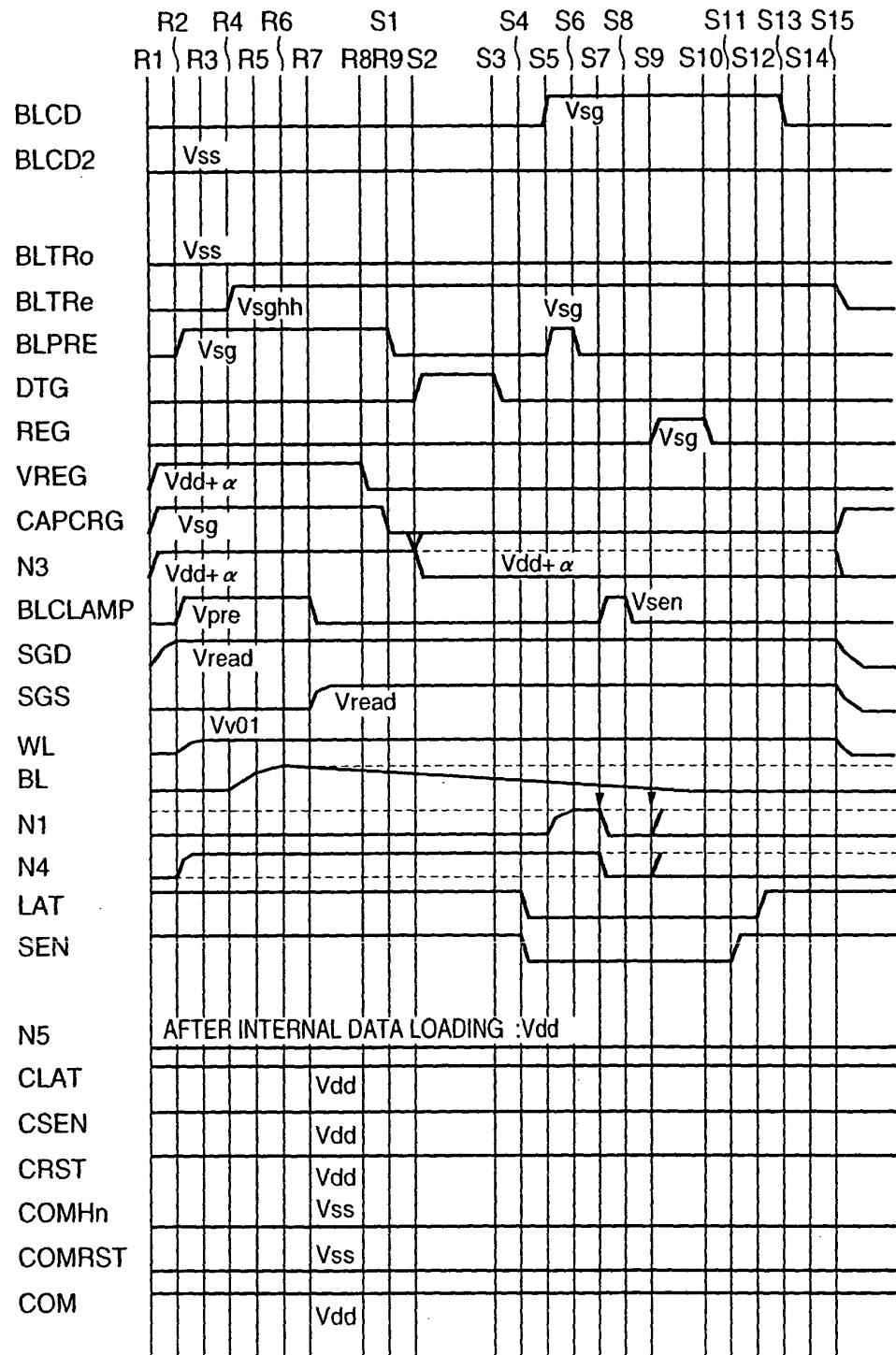


FIG.18

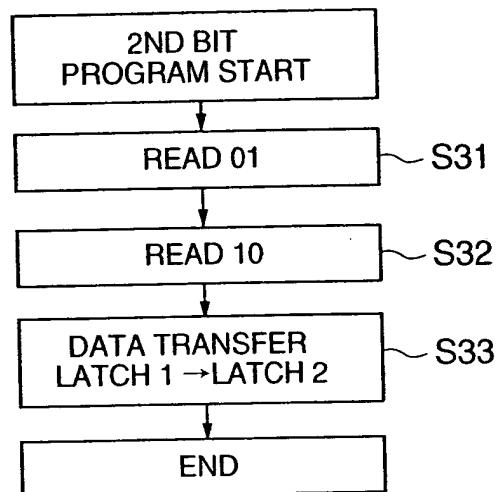


FIG.19A

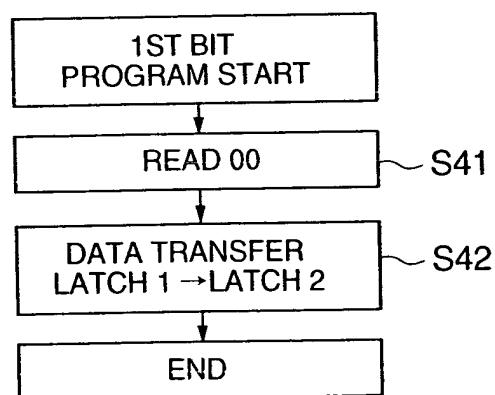


FIG.19B

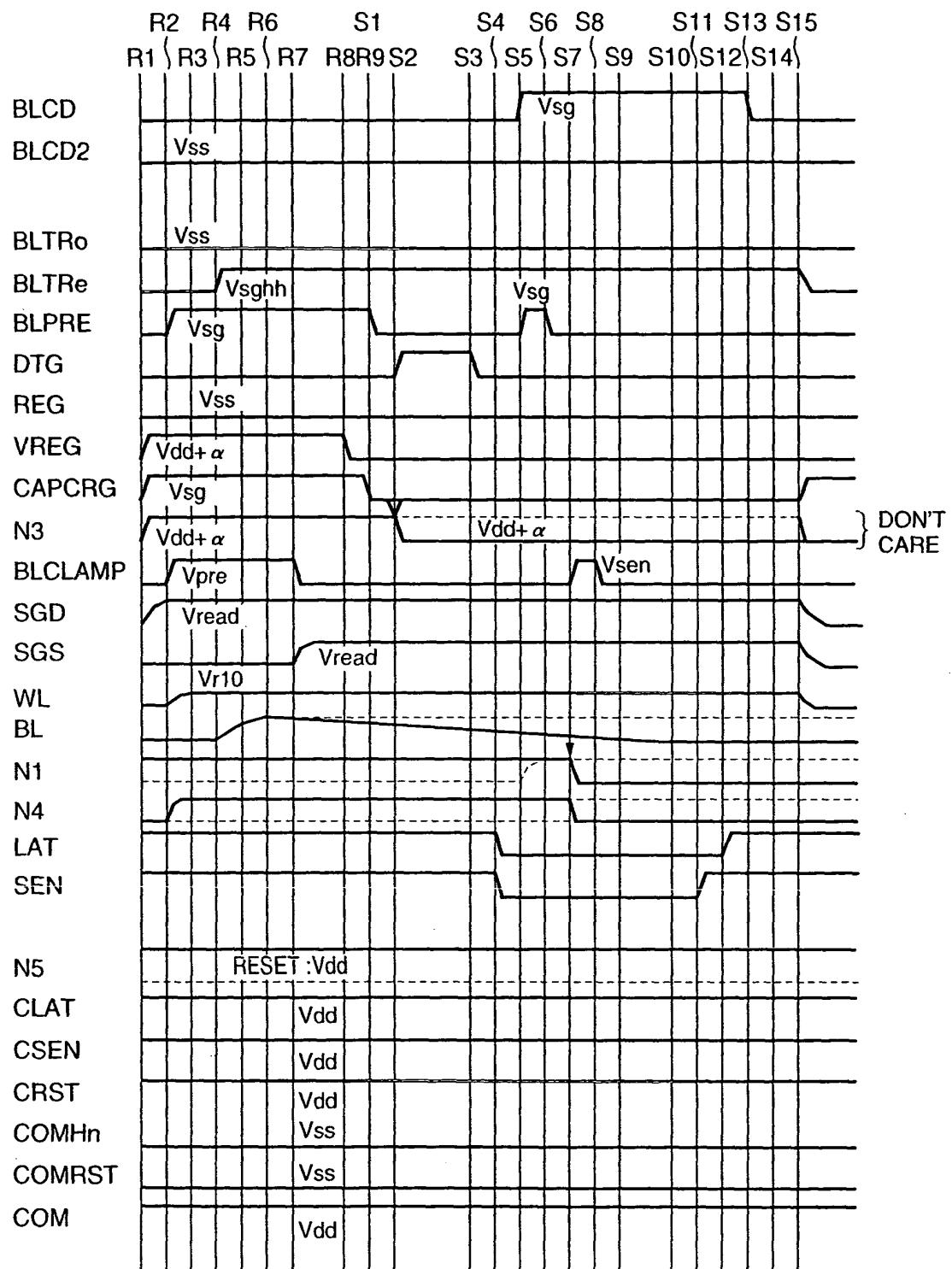


FIG.20

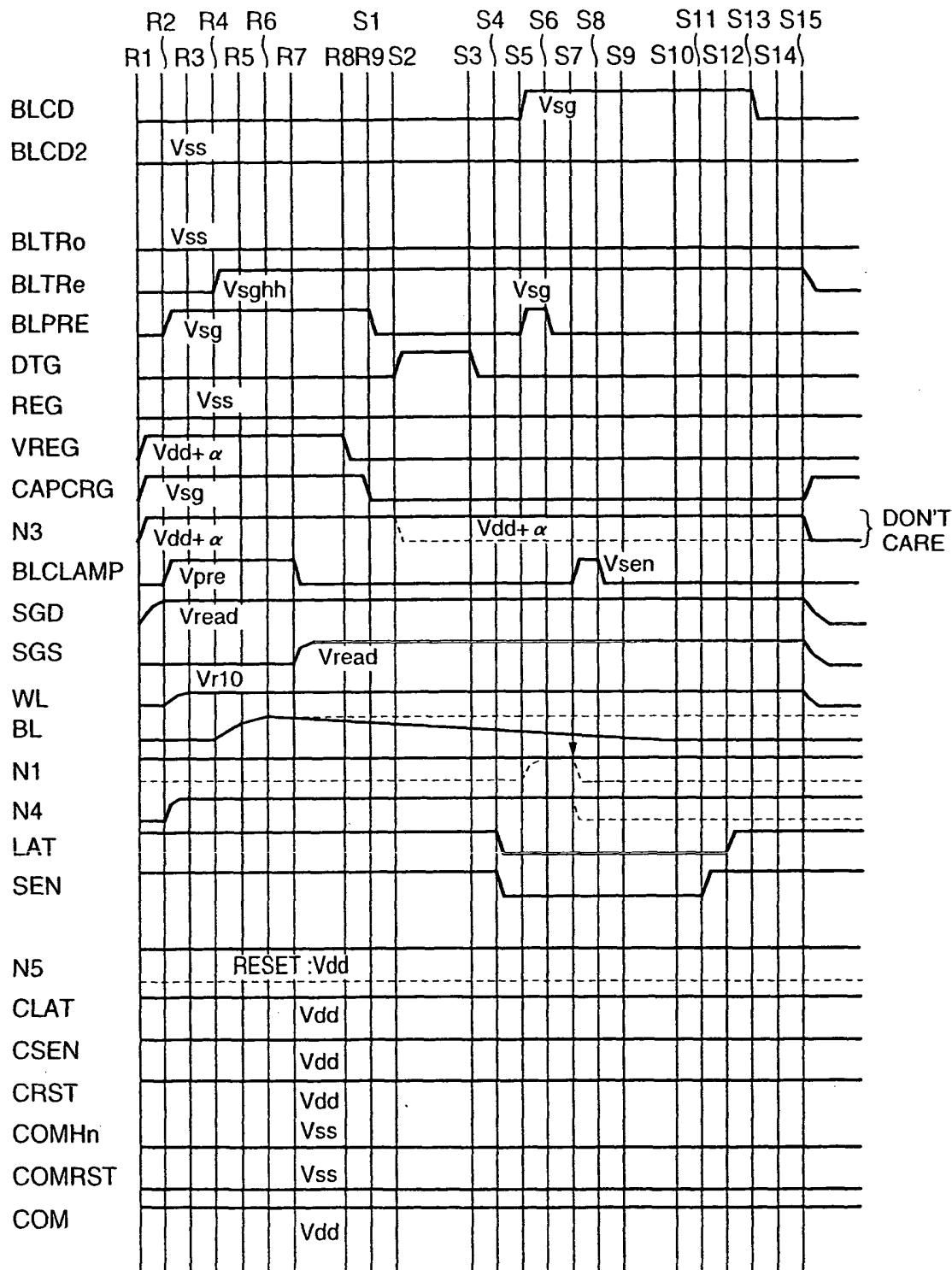


FIG.21

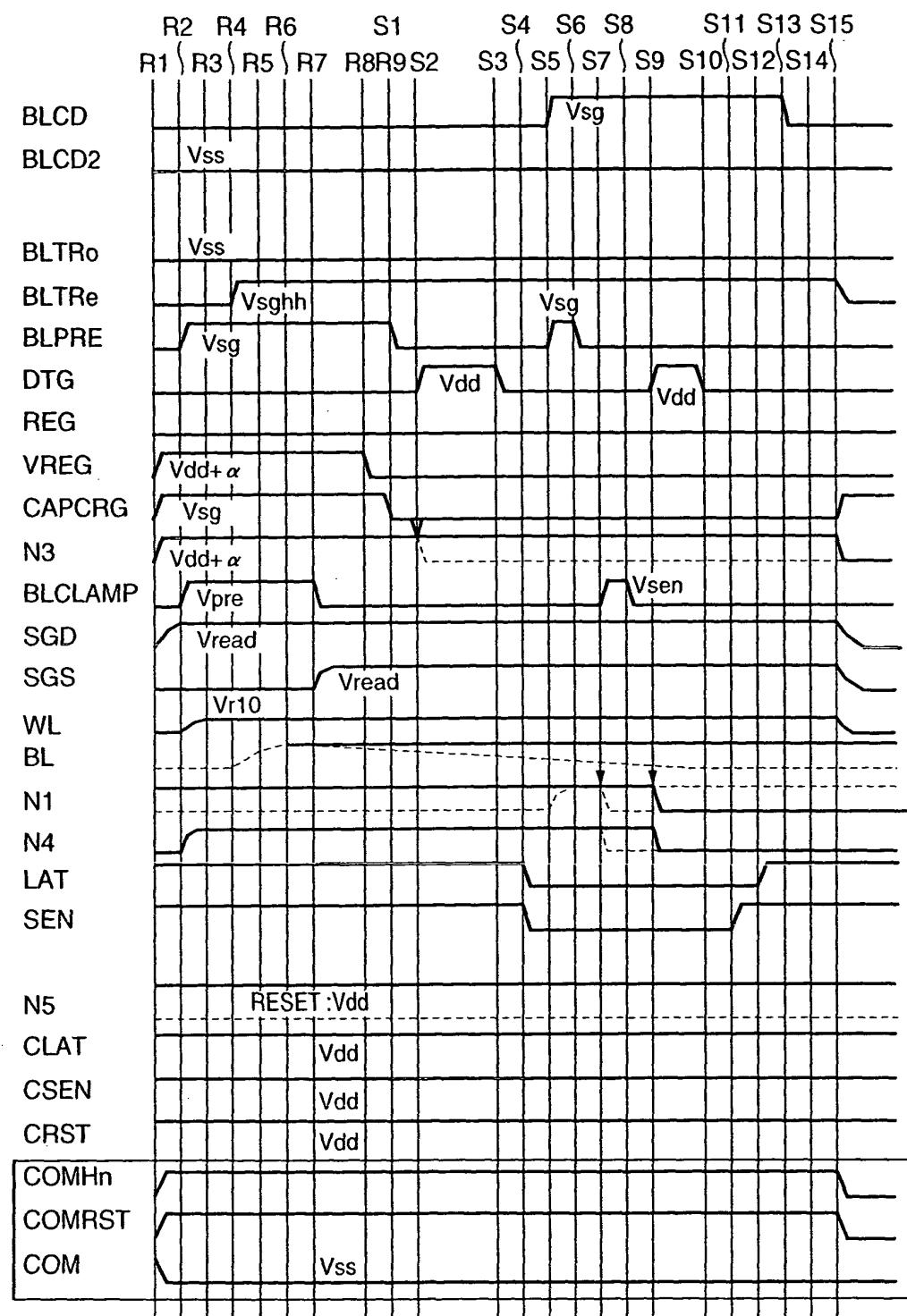


FIG.22

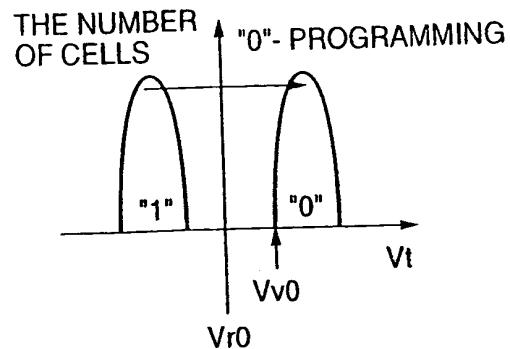


FIG.23

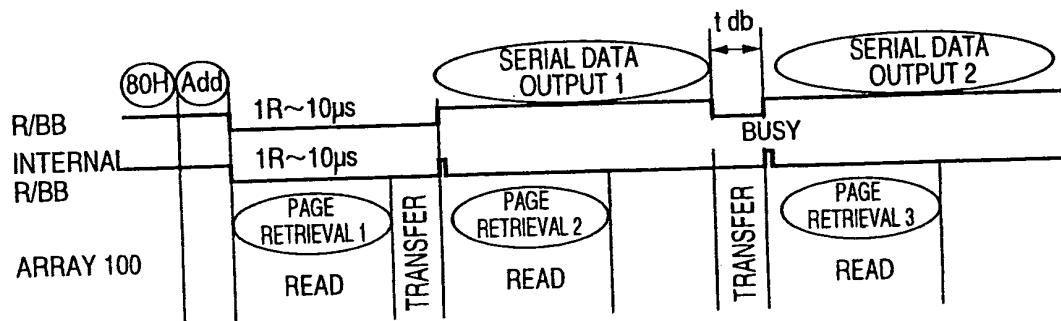


FIG.24A

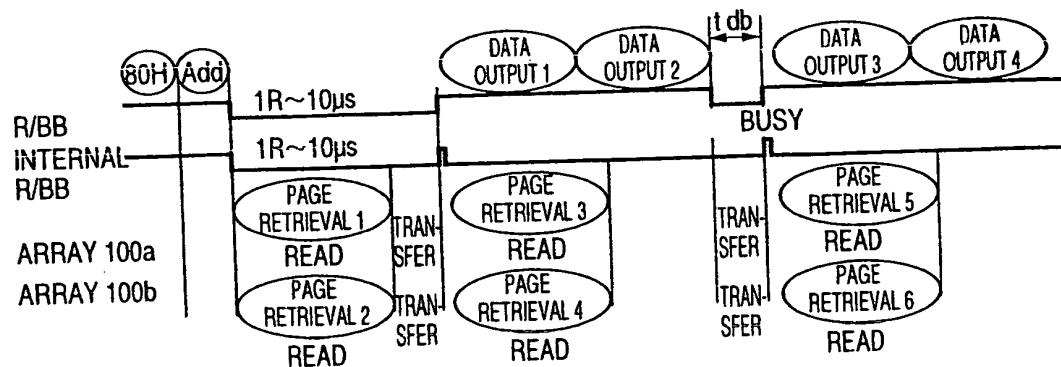


FIG.24B

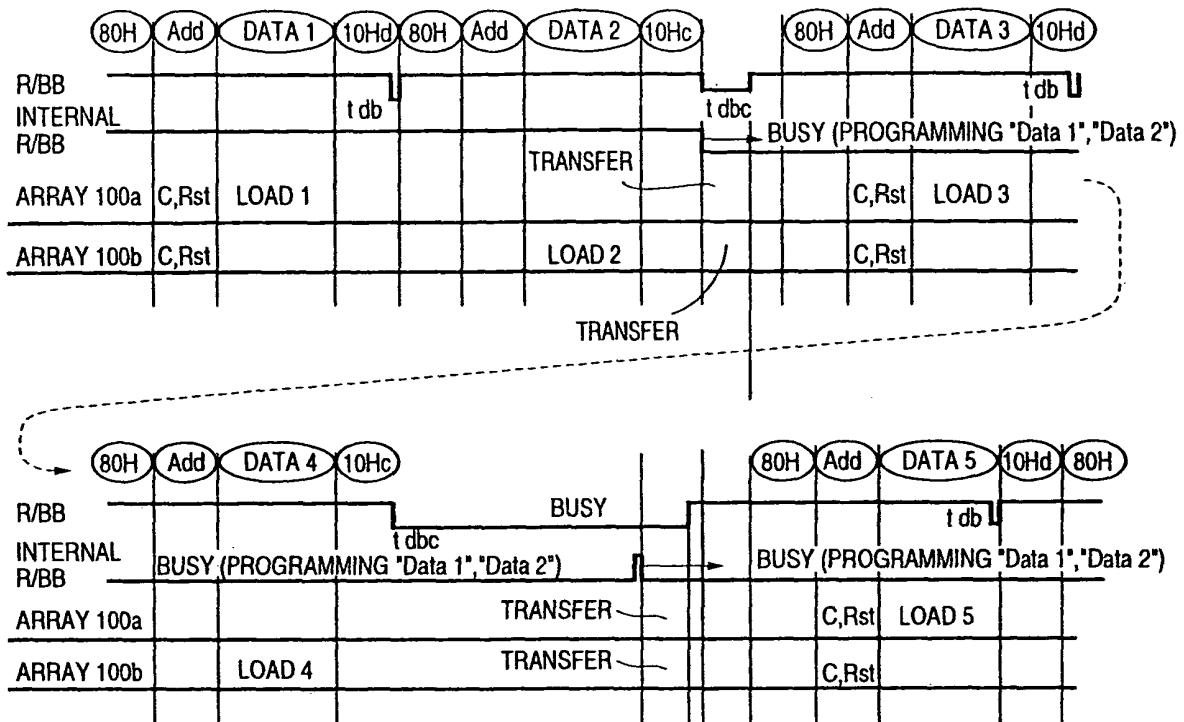


FIG.25A

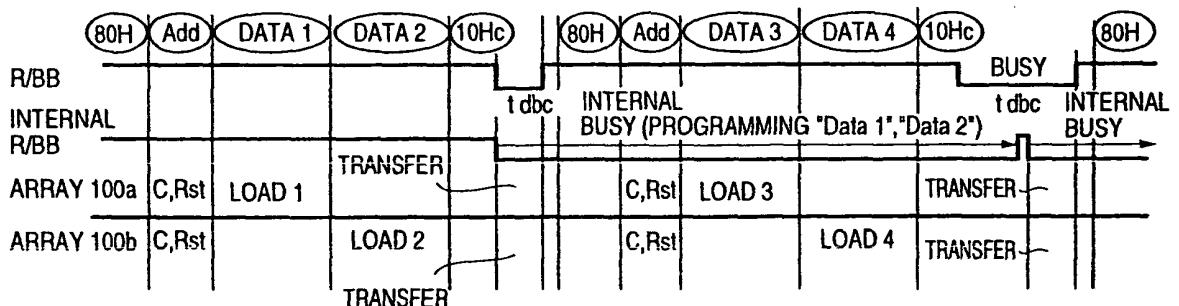


FIG.25B

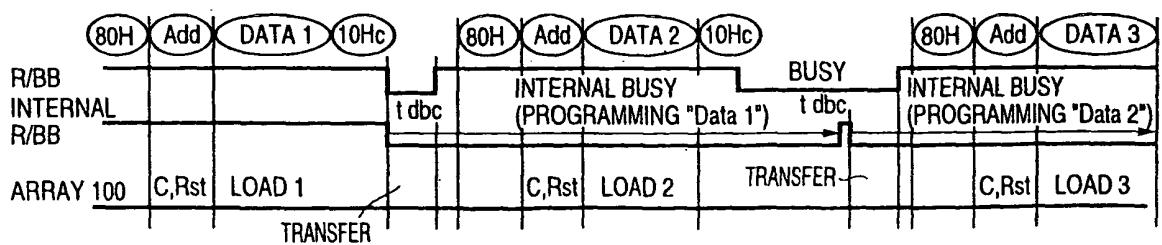


FIG.25C

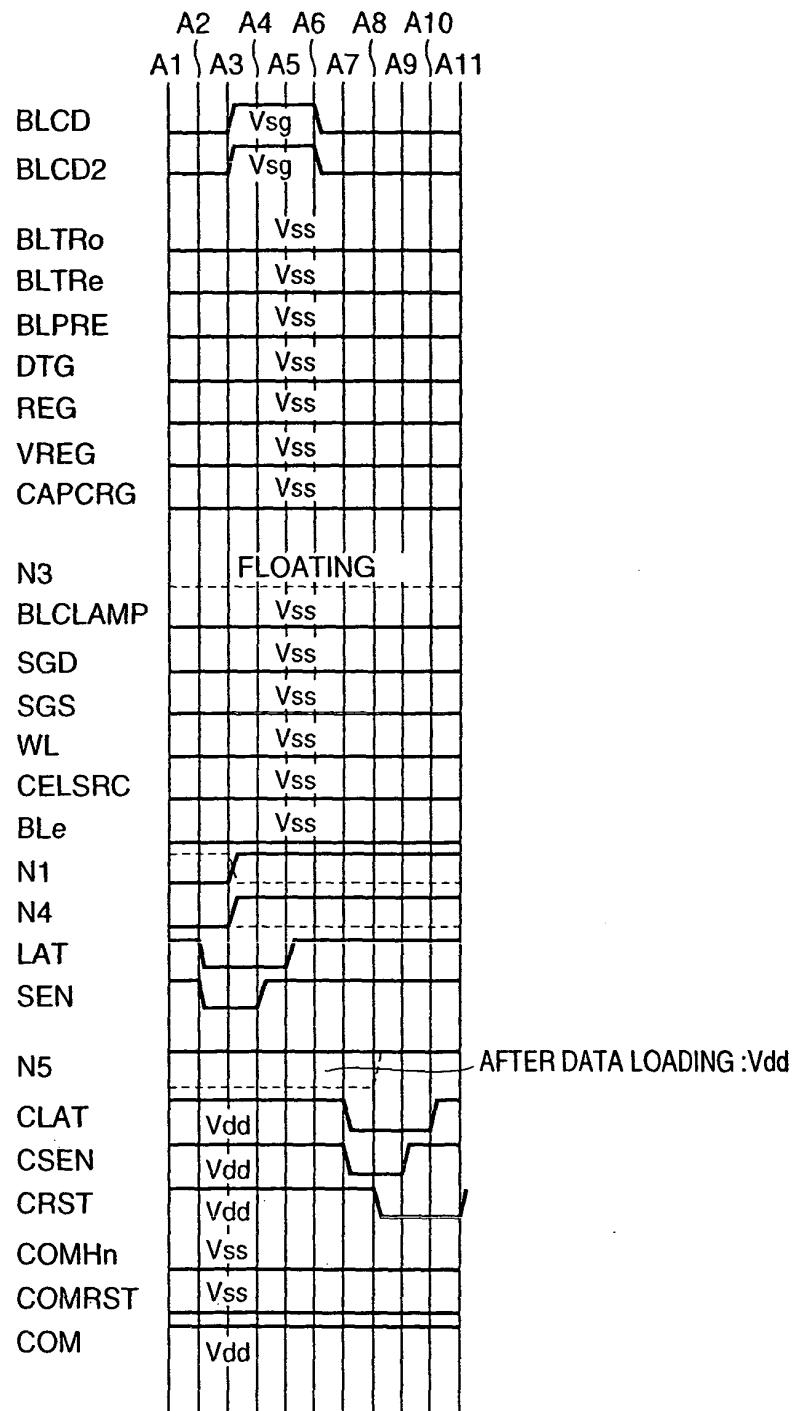


FIG.26

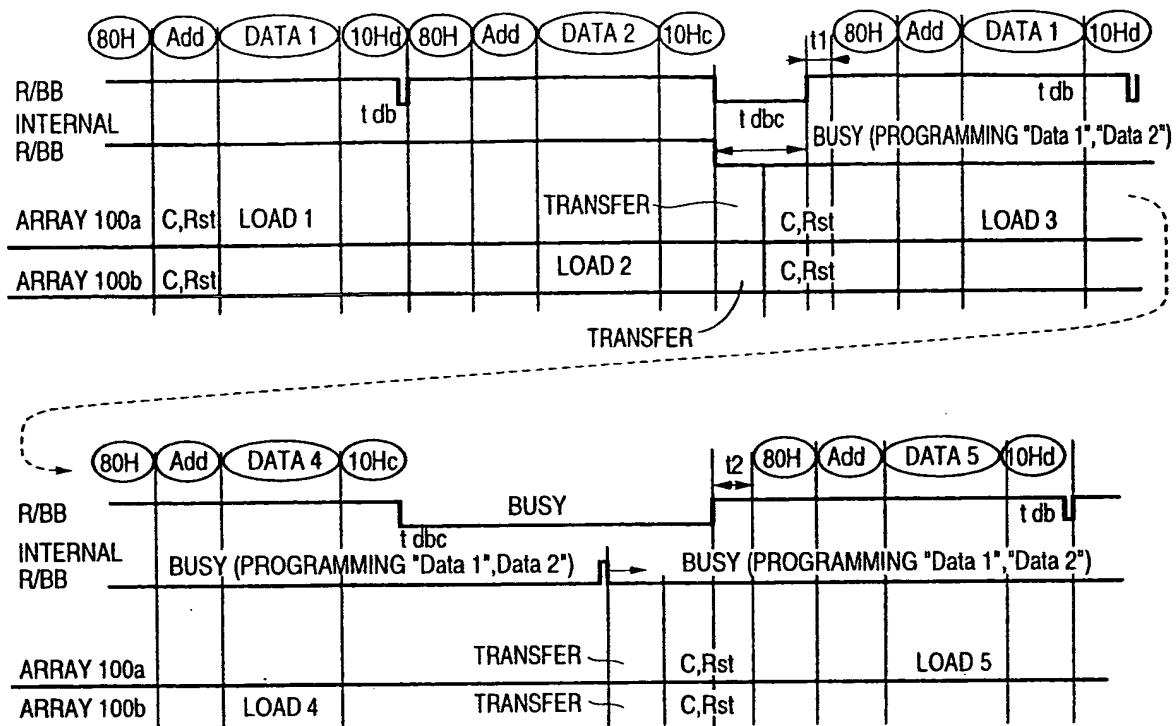


FIG.27

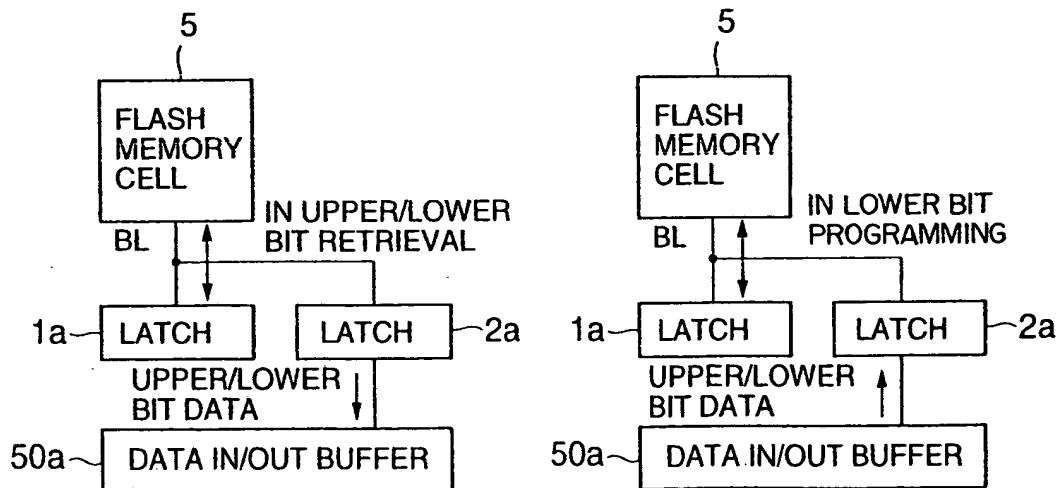


FIG.28A

FIG.28B

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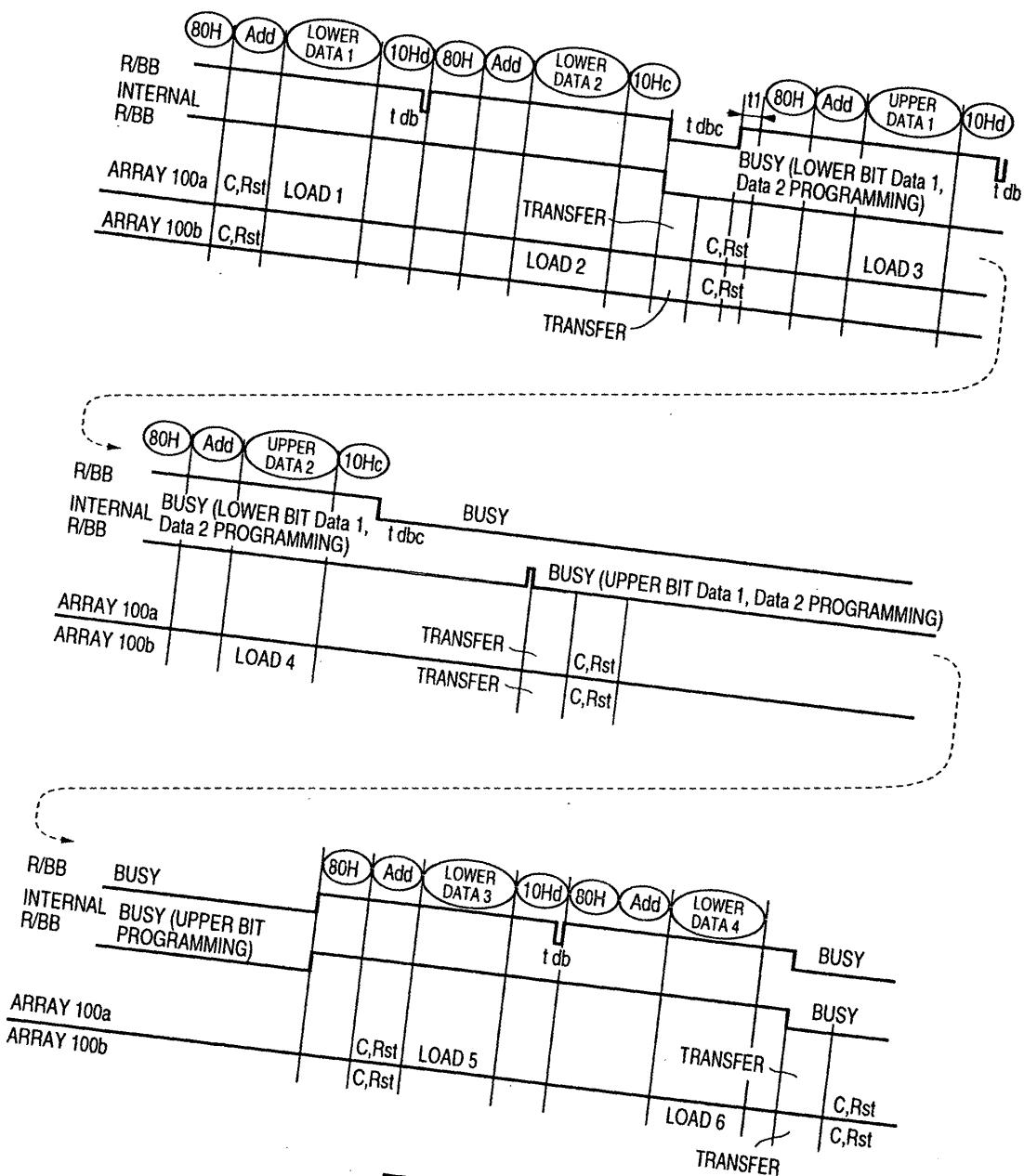


FIG.29

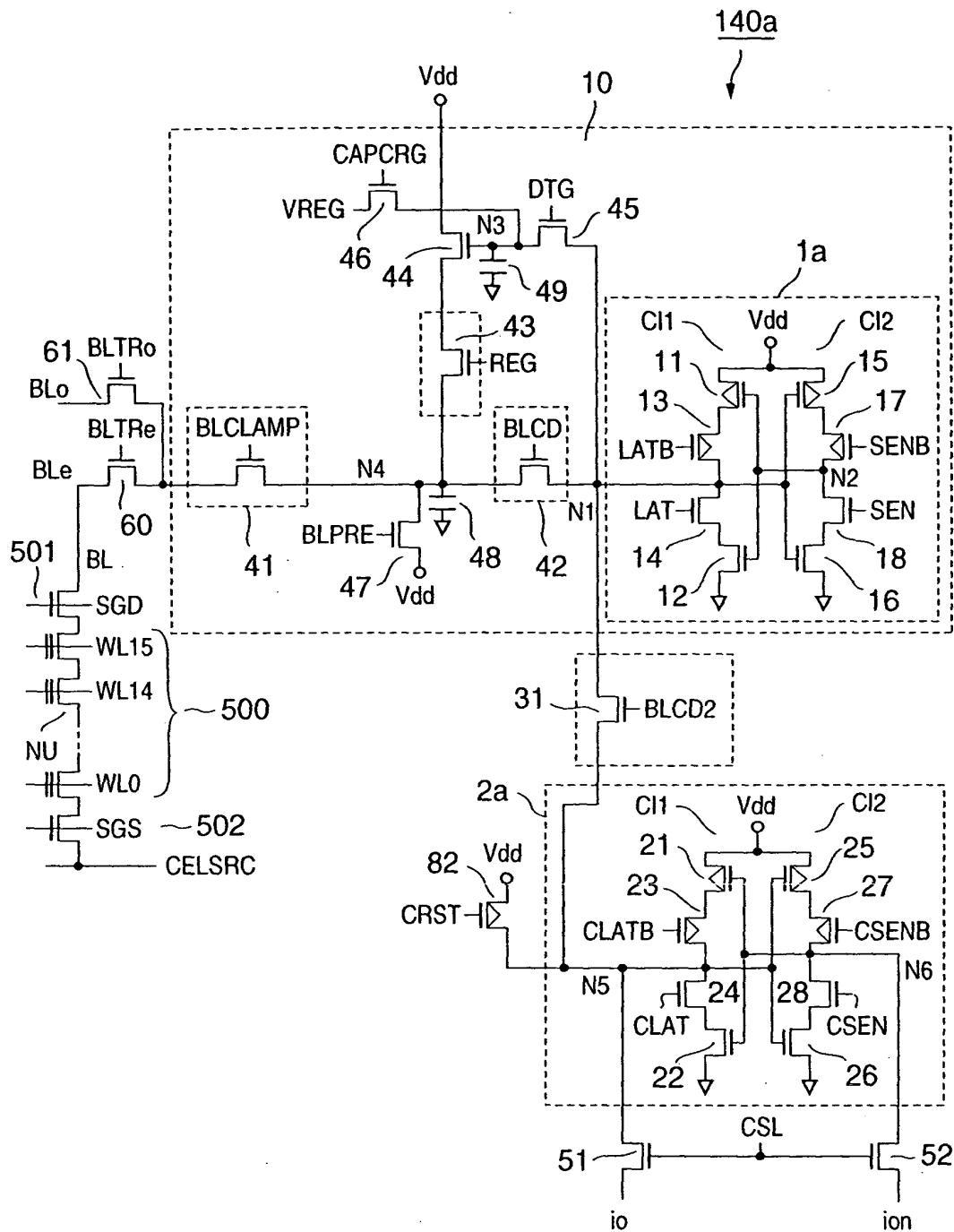


FIG.30

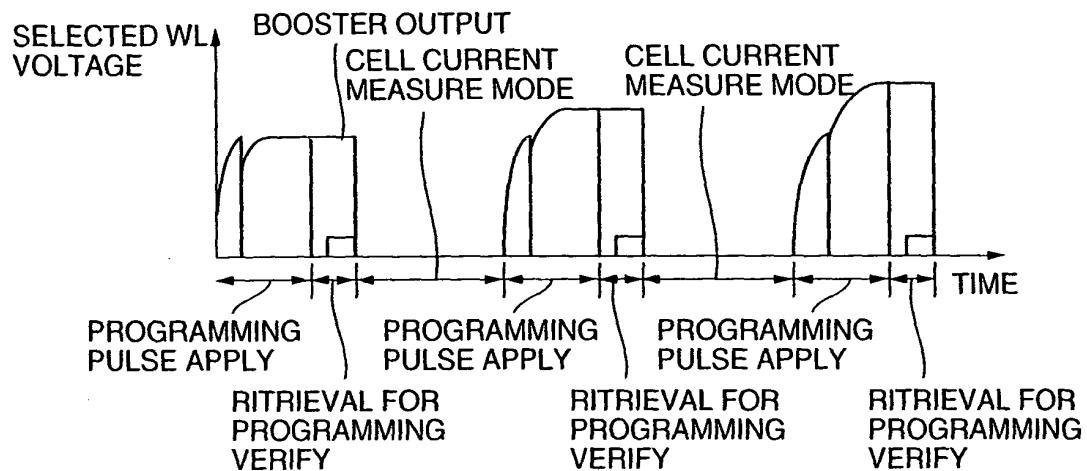


FIG.31A

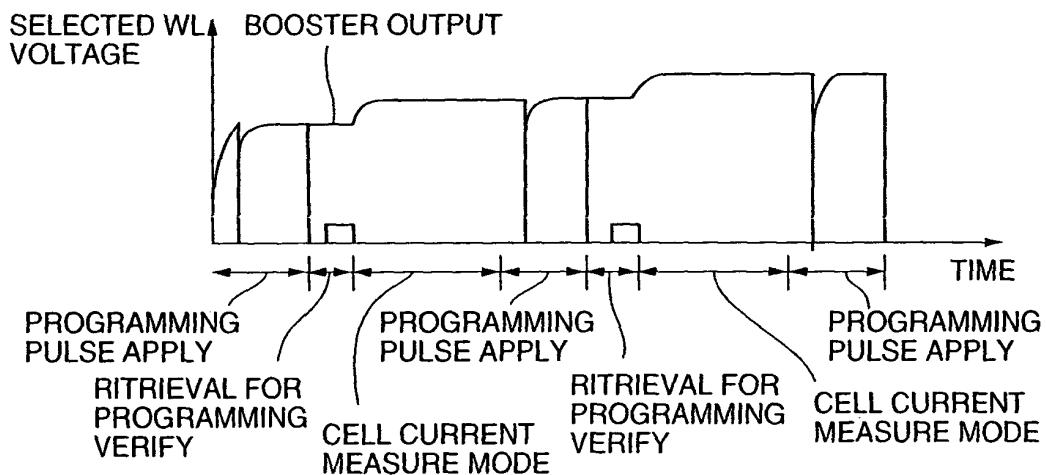


FIG.31B

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	BL-POTENTIAL	NODE N1	NODE N3	SELECTED WL
PROGRAM START				
DATA AFTER LOADED	—	L(LOADED DATA)	—	OV
IN PROGRAMMING	L	L	—	Vpgmi
<VERIFY START>				
BL RE- CHARGE BEFORE SENSE	H	L	L(FROM N1)	Vv10
BL POTENTIAL SENSE	L/H	H→L/H	L	Vv10
SENSED NODE RE-CHARGE	L/H	L/H	L	Vv10
DATA STORE	L/H	L(FAIL)/H(PASS)	L	Vv10

FIG.32

	BL-POTENTIAL	NODE N1	NODE N3	SELECTED WL
PROGRAM START				
AFTER DATA LOADED	—	H(LOADED DATA)	—	OV
IN PROGRAMMING	H	H	—	Vpgmi
<VERIFY START>				
BL PRE- CHARGE BEFORE SENSE	H	H	H(FROM N1)	Vv10
BL POTENTIAL SENSE	L/H	H→L/H	H	Vv10
SENSED NODE RE-CHARGE	L/H	H(FROM N3)	H	Vv10
DATA STORE	L/H	H(PASS)	H	Vv10

FIG.33

	BL-POTENTIAL	NODE N1	N3	N5	SELECTED WL
<PROGRAM START>					
AFTER DATA LOADED	—	L (LOADED DATA)	—	L ("11")	OV
IN PROGRAMMING	L	L	—	—	Vpgmi
<VERIFY "00" START>					
BL PRE- CHARGE BEFORE SENSE	L (FROM N5)	L	L (FROM N1)	L	Vv00
BL POTENTIAL SENSE	L	H→L	L	L	Vv00
SENSED NODE RE-CHARGE	L	L	L	L	Vv00
DATA STORE	L	L (FAIL)	L	L	Vv00
<VERIFY "01" START>					
BL PRE- CHARGE BEFORE SENSE	H	L	L (FROM N1)	L	Vv01
BL POTENTIAL SENSE	L/H	H→L/H	L (FROM N1)	L	Vv01
SENSED NODE RE-CHARGE	L (FROM N1)	L/H	L	L	Vv01
DATA STORE	L/H	L(FAIL)/H(PASS)	L	L	Vv01

FIG.34

	LOADED DATA	NODE N1	N3	N5	SELECTED WL
<PROGRAM START>					
AFTER DATA LOADED	—	L (LOADED DATA)	—	H ("10")	OV
IN PROGRAMMING	L	L	—	—	Vpgmi
<VERIFY "00" START>					
BL PRE- CHARGE BEFORE SENSE	H (FROM N5)	L	L (FROM N1)	H	Vv00
BL POTENTIAL SENSE	L/H	H→L/H	L	H	Vv00
SENSED NODE RE-CHARGE	L/H	L/H	L	H	Vv00
DATA STORE	L/H	L (FAIL) / H (PASS)	L	H	Vv00
<VERIFY "01" START>					
BL PRE- CHARGE BEFORE SENSE	H	⌘ H	H (FROM N1)	H	Vv01
BL POTENTIAL SENSE	⌘ L	H→⌘ L	⌘ H	H	Vv01
SENSED NODE RE-CHARGE	⌘ L	L (FROM N3)	⌘ H	H	Vv01
DATA STORE	⌘ L	⌘ H (PASS)	⌘ H	H	Vv01

FIG.35

	BL-POTENTIAL	NODE N1	N3	N5	SELECTED WL
<PROGRAM START>					
AFTER DATA LOADED	—	H (LOADED DATA)	—	L ("11")	OV
IN PROGRAMMING	H	H	—	—	Vpgmi
<VERIFY "00" START>					
BL PRE- CHARGE BEFORE SENSE	L (FROM N5)	H	H (FROM N1)	L	Vv00
BL POTENTIAL SENSE	L	H → L	H	L	Vv00
SENSED NODE RE-CHARGE	L	H (FROM N3)	H	L	Vv00
DATA STORE	L	H (PASS)	H	L	Vv00
<VERIFY "01" START>					
BL PRE- CHARGE BEFORE SENSE	H	H	H (FROM N1)	L	Vv01
BL POTENTIAL SENSE	L	H → L/H	H	L	Vv01
SENSED NODE RE-CHARGE	L	H (FROM N3)	H	L	Vv01
DATA STORE	L	H (PASS)	H	L	Vv01

FIG.36

	LOADED DATA	NODE N1	N3	N5	SELECTED WL
<PROGRAM START>					
AFTER DATA LOADED	—	H (LOADED DATA)	—	H ("10")	OV
IN PROGRAMMING	H	H	—	—	Vpgmi
<VERIFY START>					
BL PRE- CHARGE BEFORE SENSE	H (FROM N5)	H	H (FROM N1)	H	Vv00
BL POTENTIAL SENSE	L	H → L	H	H	Vv00
SENSED NODE RE-CHARGE	L	H (FROM N3)	H	H	Vv00
DATA STORE	L	H (PASS)	H	H	Vv00
<VERIFY "01" START>					
BL PRE- CHARGE BEFORE SENSE	H	H	H (FROM N1)	H	Vv01
BL POTENTIAL SENSE	L	H → L	H	H	Vv01
SENSED NODE RE-CHARGE	L	H (FROM N3)	H	H	Vv01
DATA STORE	L	H (PASS)	H	H	Vv01

FIG.37

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	BL-POTENTIAL	NODE N1	N3	SELECTED WL
RETRIEVAL "00" START				
BL PRE- CHARGE BEFORE SENSING	H	H	—	Vr 00
BL POTENTIAL SENSING	L/H	H → L/H	—	Vr 00
DATA STORE	L/H	L ("1") / H ("0")	—	Vr 00

FIG.38

	BL-POTENTIAL	NODE N1	N3	SELECTED WL
RETRIEVAL "01" START				
BL PRE- CHARGE BEFORE SENSING	H	H	—	Vr 01
BL POTENTIAL SENSING	L/H	H → L/H	—	Vr 01
DATA STORE	L/H	L/H	—	Vr 01

FIG.39

	BL-POTENTIAL	NODE N1	N3	SELECTED WL
RETRIEVAL "01" START				
BL PRE- CHARGE BEFORE SENSING	H	H	H (FROM N1)	Vr 10
BL POTENTIAL SENSING	H	H → H	H	Vr 10
SENSED NODE RE- CHARGE	H	L (FROM N3)	H	Vr 10
DATA STORE	H	L ("1")	H	Vr 10

FIG.40

	BL-POTENTIAL	NODE N1	N3	SELECTED WL
RETRIEVAL "01" START				
BL PRE- CHARGE BEFORE SENSING	H	L	L (FROM N1)	Vr 10
BL POTENTIAL SENSING	L/H	H → L/H	L	Vr 10
SENSED NODE RE- CHARGE	L/H	L/H	L	Vr 10
DATA STORE	L/H	L ("1") / H ("0")	L	Vr 10

FIG.41

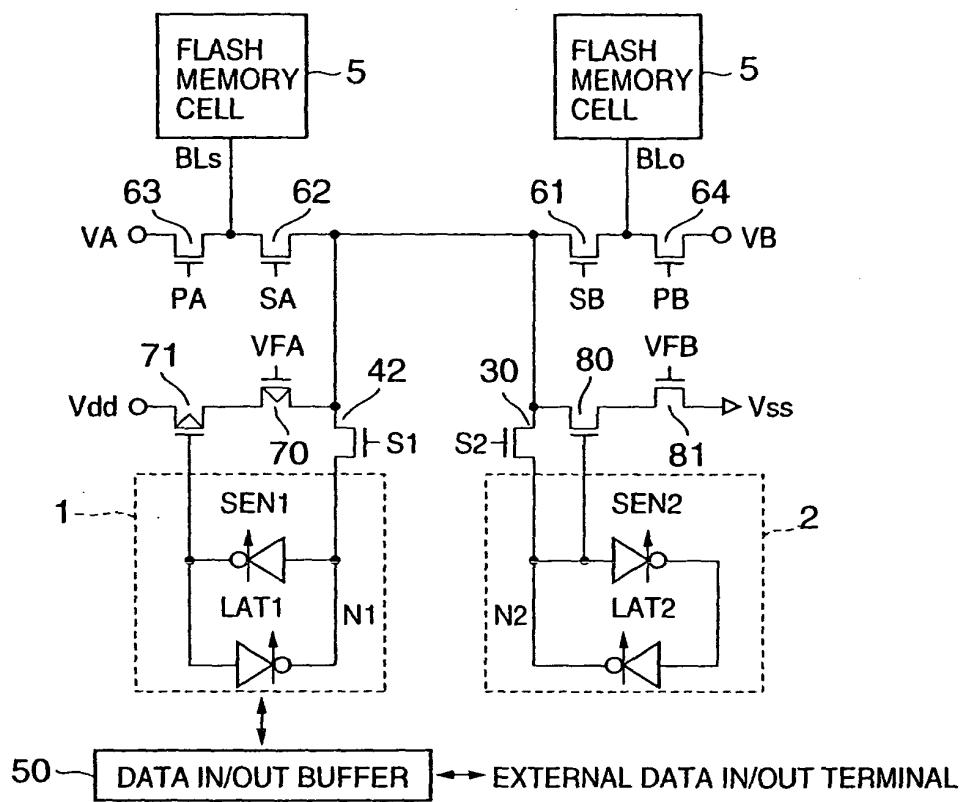


FIG.42 (RELATED ART)

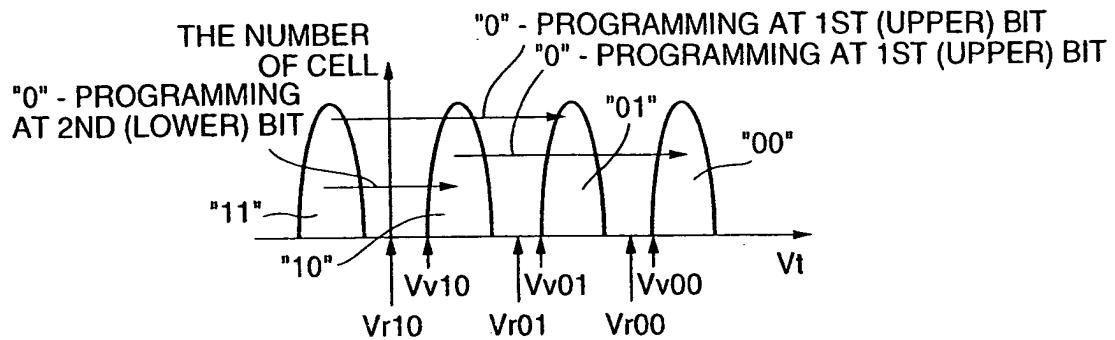


FIG.43A

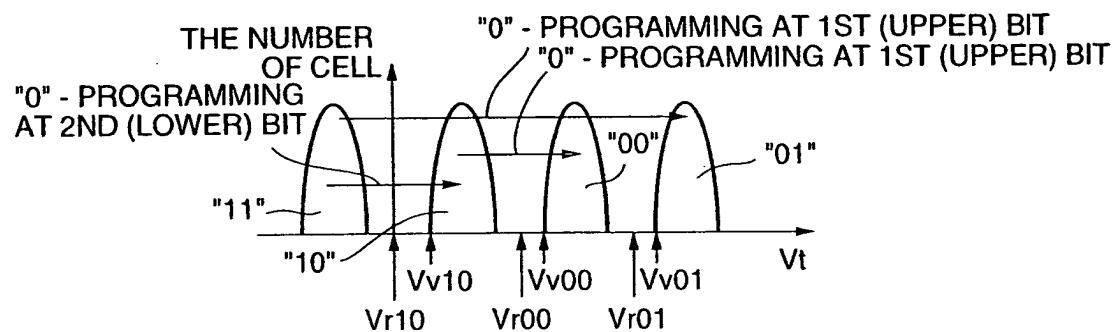


FIG.43B

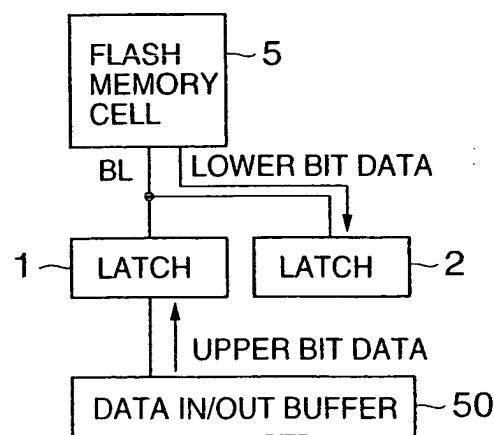


FIG.44 (RELATED ART)

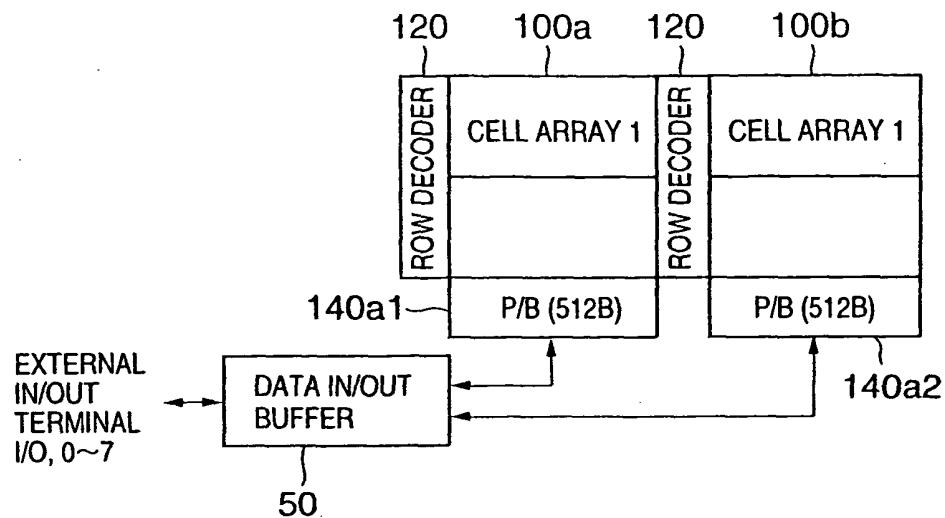


FIG.45A (RELATED ART)

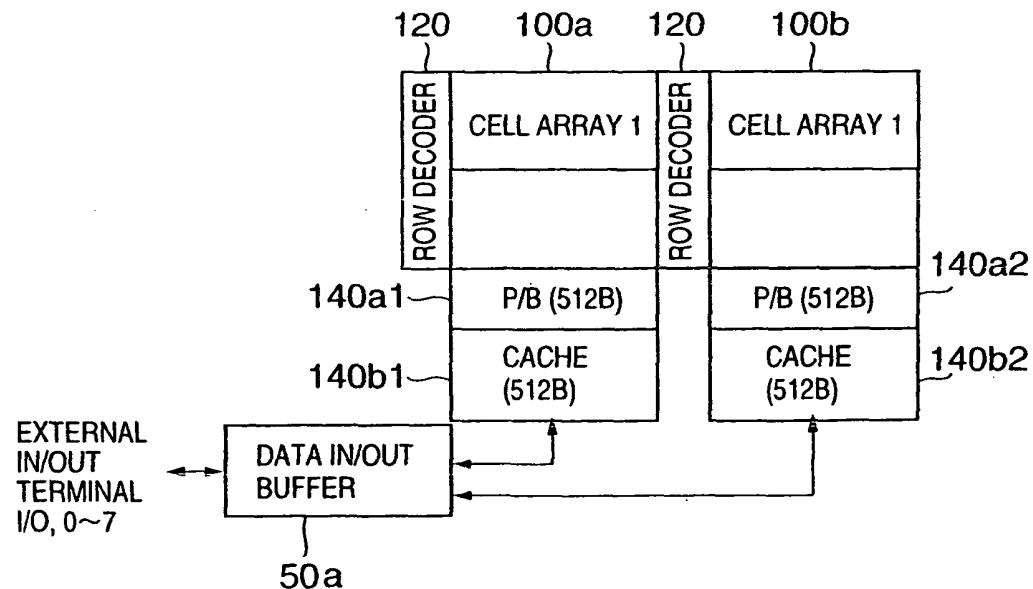


FIG.45B

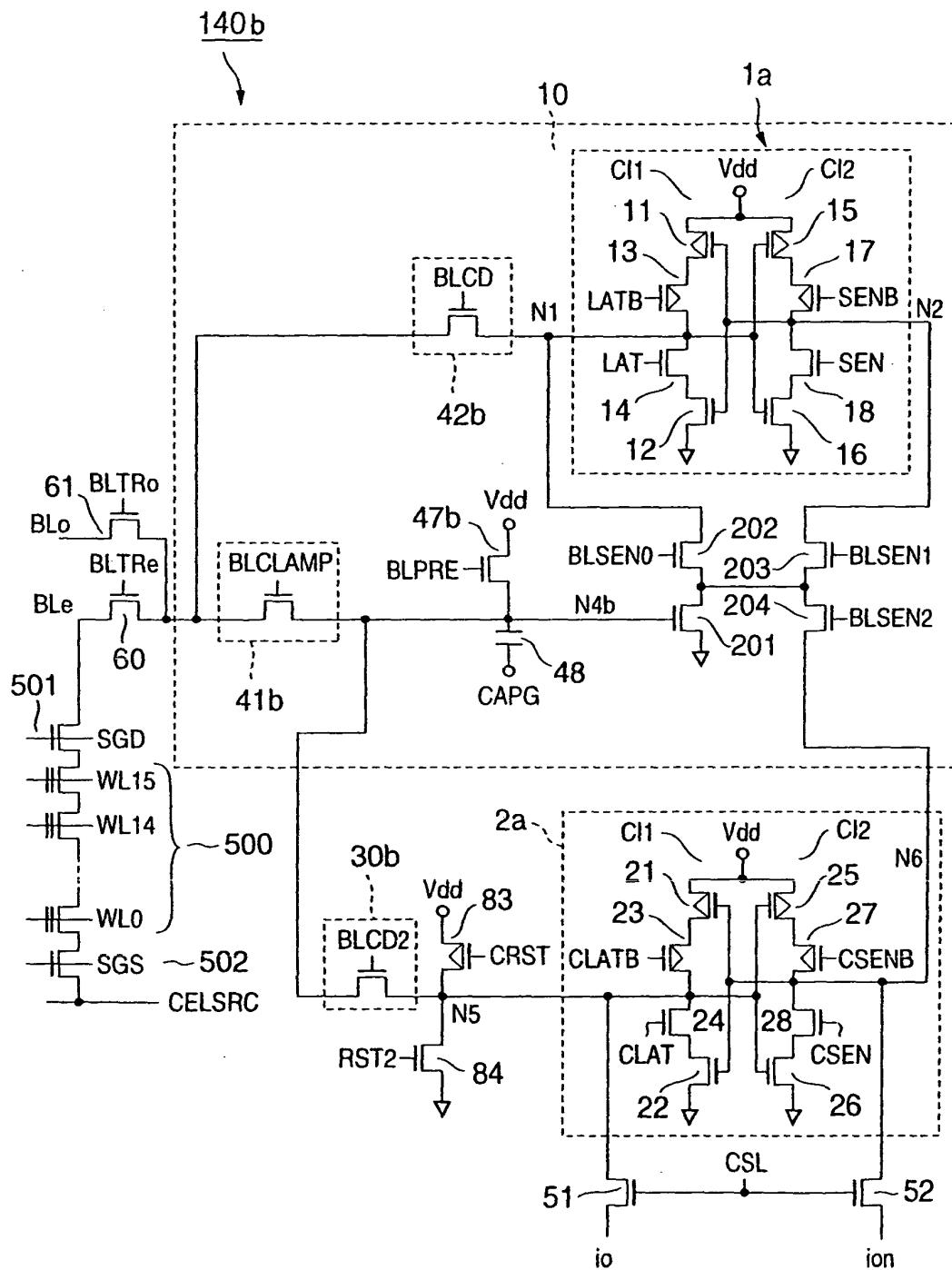


FIG.46

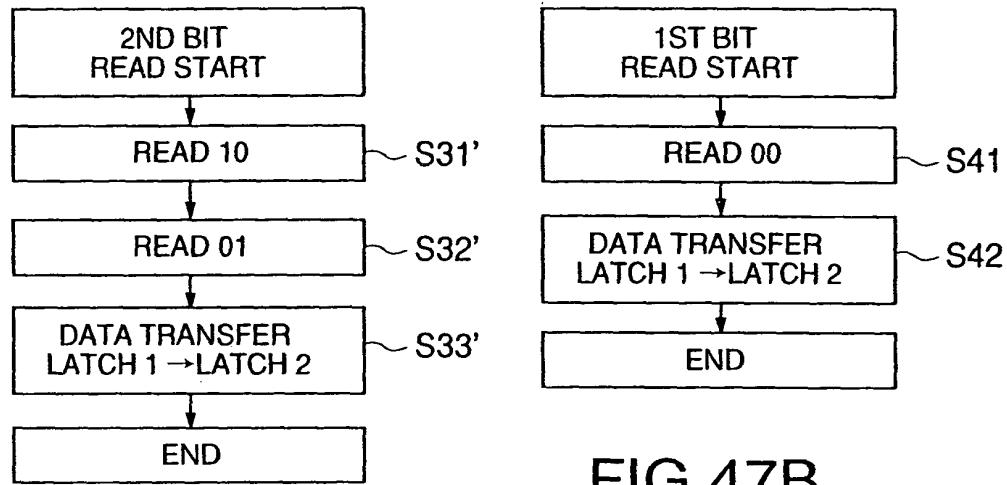


FIG.47B

FIG.47A

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
<PROGRAM START>						
DATA AFTER LOADED	—		—	H	L (LATCH 1a)	OV
IN PROGRAMMING	L		—	H	L	Vpgmi
<VERIFY "10">						
BL PRE-CHARGE	H		H	H	L	Vv10
RESET	H	NULL	H	H	L	Vv10
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	Vv10
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	H→ L/H	L (FAIL) / H (PASS)	Vv10

FIG.48

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
<PROGRAM START>	—	—	—	—	—	—
DATA AFTER LOADED	—	—	—	L	H (LATCH 1)	OV
IN PROGRAMMING	H	—	—	L	H	Vpgmi
<VERIFY "10">	—	—	—	—	—	—
BL PRE- CHARGE	H	—	H	L	H	Vv10
RESET	H	NULL	H	L	H	Vv10
BL- POTENTIAL SENSE	L/H	—	H→ L/H	L	H	Vv10
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	L→ L/H	H (PASS)	Vv10

FIG.49

	BL-POTENTIAL	LATCH CONTROL	N4b	N6	N5	SELECTED WL
BL PRE- CHARGE	H	—	H	H/L	L/H	Vr10
RESET	H	RST2	H	H/L →H	L/H→L	Vr10
BL- POTENTIAL SENSE	L/H	—	H→ L/H	H	L	Vr10
SENSED DATA RETRIEVAL	L/H	BLSEN2	L/H	H→ L/H	L ("1") / H ("0")	Vr10

FIG.50

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	N5	SELECTED WL
<PROGRAM START>							
DATA AFTER LOADED	—		—	H	L	L("11" DATA)	OV
IN PROGRAMMING	L		—	H	L	L	Vpgmi
<VERIFY "00">							
BL PRE- CHARGE	L (FROM 5)			L	H	L	Vv00
RESET	L	NULL	L	H	L	L	Vv00
BL- POTENTIAL SENSE	L		L	H	L	L	Vv00
SENSED DATA RETRIEVAL	L	BLSEN1	L	H	L (FAIL)	L	Vv00
<VERIFY "01">							
BL PRE- CHARGE	H			H	H	L	Vv01
RESET	H	NULL	H	H	L	L	Vv01
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	L	Vv01
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	H→ L/H	L→ L (FAIL)/H (PASS)	L	Vv01

FIG.51

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	N5	SELECTED WL
<PROGRAM START>							
DATA AFTER LOADED	—		—	H	L (LATCH 1a)	L ("10" DATA)	OV
IN PROGRAMMING	L		—	H	L	H	Vpgmi
<VERIFY "00">							
BL PRE- CHARGE	H (FROM 5)			H	H	L	Vv00
RESET	H	NULL	H	H	L	H	Vv00
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	H	Vv00
SENSED DATA RETRIEVAL	L/H	BLSEN1	L	H→ L/H	L→ L (FAIL)/H (PASS)	H	Vv00
<VERIFY "01">							
BL PRE- CHARGE	H		H	H (L)	L (H)	H	Vv01
RESET	H	NULL	H	H (L)	L (H)	H	Vv01
BL- POTENTIAL SENSE	※ L		※ H→ L	H (L)	L (H)	H	Vv01
SENSED DATA RETRIEVAL	※ L	BLSEN1	※ L	H (L)	L (H)	H	Vv01

FIG.52

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	N5	SELECTED WL
<PROGRAM START>							
DATA AFTER LOADED	—		—	L	H (LATCH 1)	L ("11" DATA)	OV
IN PROGRAMMING	L		—	L	H	L	Vpgmi
<VERIFY "00">							
BL PRE- CHARGE	L (FROM 5)		L	L	H	L	Vv00
RESET	L	NULL	L	L	H	L	Vv00
BL- POTENTIAL SENSE	L		L	L	H	L	Vv00
SENSED DATA RETRIEVAL	L	BLSEN1	L	L	H (PASS)	L	Vv00
<VERIFY "01">							
BL PRE- CHARGE	H		H	L	H	L	Vv01
RESET	H	NULL	H	L	H	L	Vv01
BL- POTENTIAL SENSE	※ L		※ H → L	L	H	L	Vv01
SENSED DATA RETRIEVAL	※ L	BLSEN1	※ L	L	H (PASS)	L	Vv01

FIG.53

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	N5	SELECTED WL
<PROGRAM START>							
DATA AFTER LOADED	—		—	L	H (LATCH 1)	L ("10" DATA)	OV
IN PROGRAMMING	L		—	L	H	H	Vpgmi
<VERIFY "00">							
BL PRE- CHARGE	H (FROM 5)		H	L	H	H	Vv00
RESET	H	NULL	H	L	H	H	Vv00
BL- POTENTIAL SENSE	※ L		※ H → L	L	H	H	Vv00
SENSED DATA RETRIEVAL	※ L	BLSEN1	L	L	H (PASS)	H	Vv00
<VERIFY "01">							
BL PRE- CHARGE	H		H	L	H	H	Vv01
RESET	H	NULL	H	L	H	H	Vv01
BL- POTENTIAL SENSE	※ L		※ H → L	L	H	H	Vv01
SENSED DATA RETRIEVAL	※ L	BLSEN1	※ L	L	H (PASS)	H	Vv01

FIG.54

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	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
BL PRE- CHARGE	H		H	L/H	L/H	Vr00
RESET	H	BLSEN0	H	H/L →H	L/H→L	Vr00
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	Vr00
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	H→ L/H	L→ L ("1") / H ("0")	Vr00

FIG.55

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
BL PRE- CHARGE	H		H	H/L	L/H	Vr10
RESET	H	BLSEN0	H	H/L →H	L/H→L	Vr10
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	Vr10
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	H→ L/H	L→ L ("1") / H ("0")	Vr10

FIG.56

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
BL PRE- CHARGE	H		H	H	L ("1")	Vr01
RESET	H	NULL	H	H	L	Vr01
BL- POTENTIAL SENSE	※ L		※ H →L	H	L	Vr01
SENSED DATA RETRIEVAL	※ L	BLSEN0	※ L	H	L ("1")	Vr01

FIG.57

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
BL PRE- CHARGE	H		H	L	H	Vr01
RESET	H	NULL	H	L	H	Vr01
BL- POTENTIAL SENSE	L/H		H→ L/H	L	H	Vr01
SENSED DATA RETRIEVAL	L/H	BLSEN0	L/H	L	H→ L ("1") / H ("0")	Vr01

FIG.58

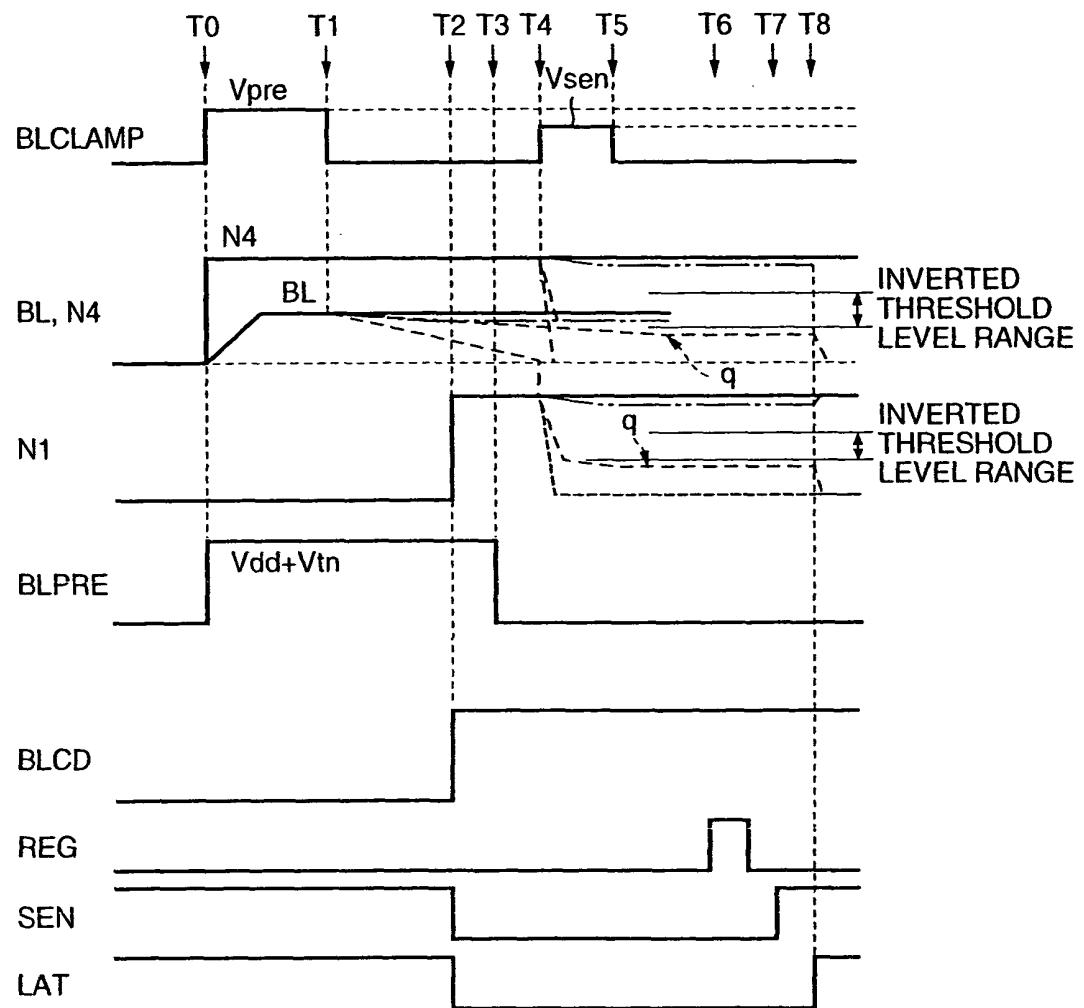


FIG.59

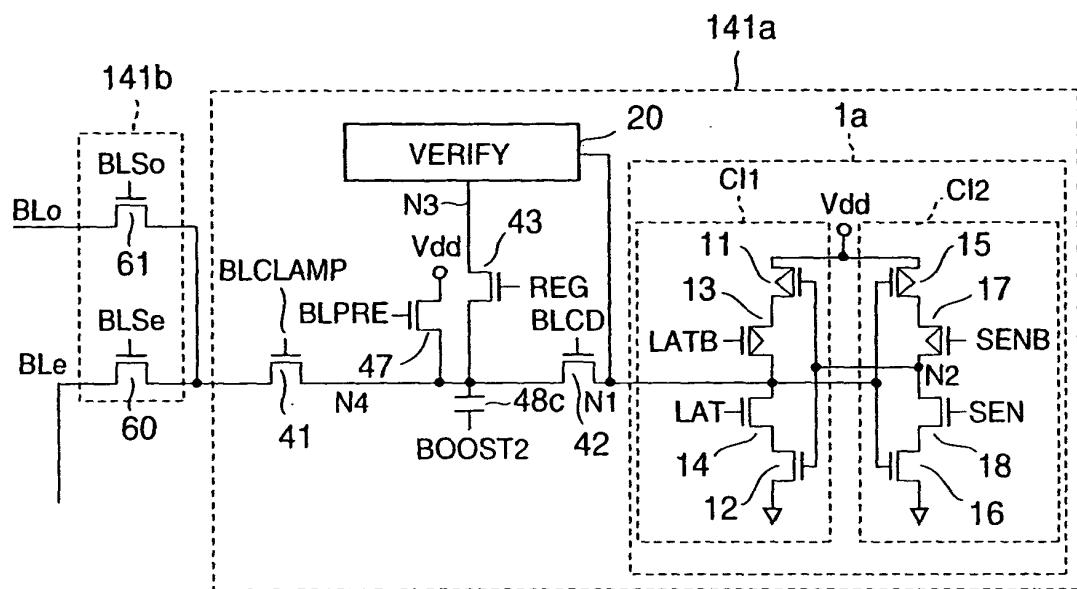


FIG.60

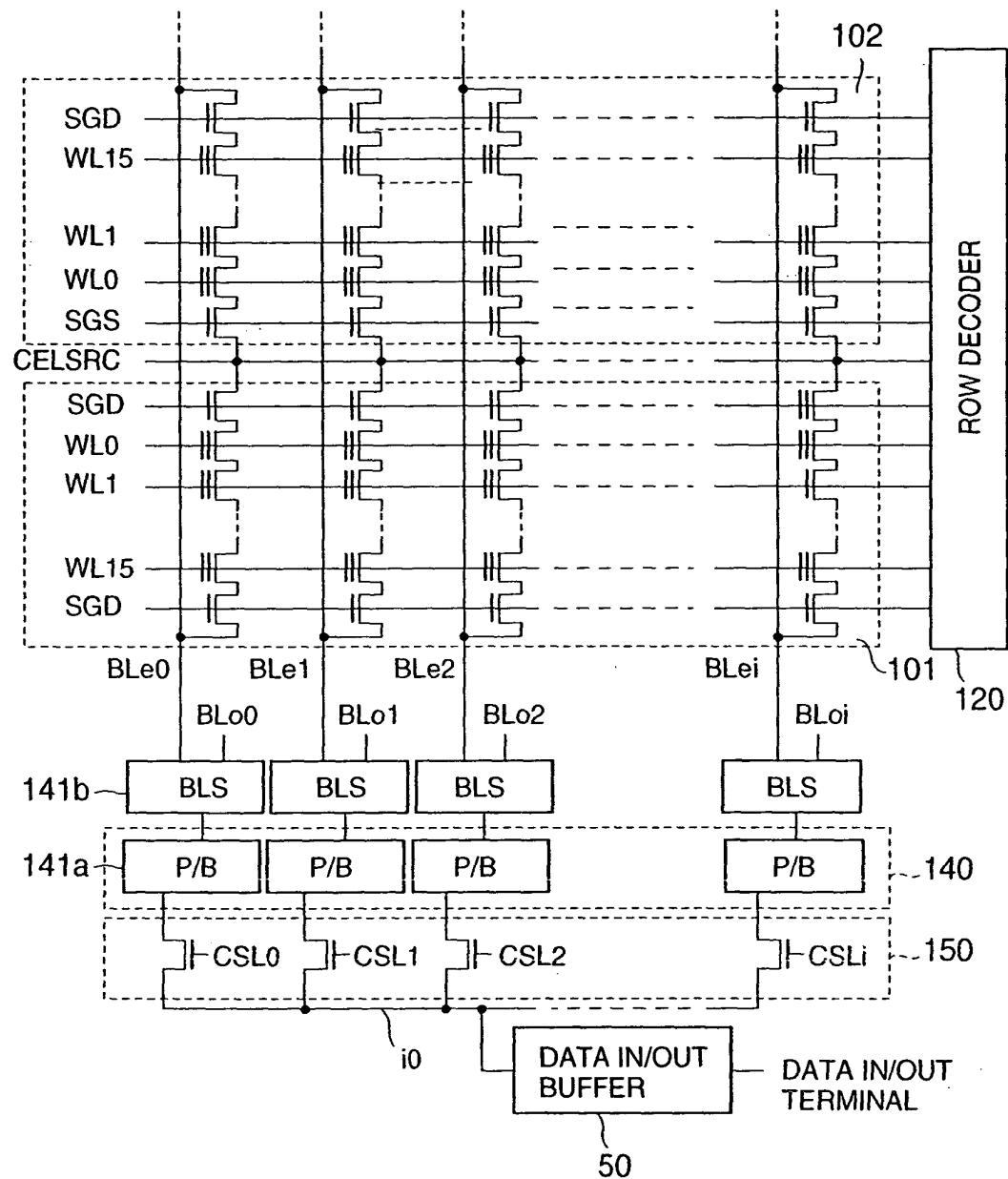


FIG.61

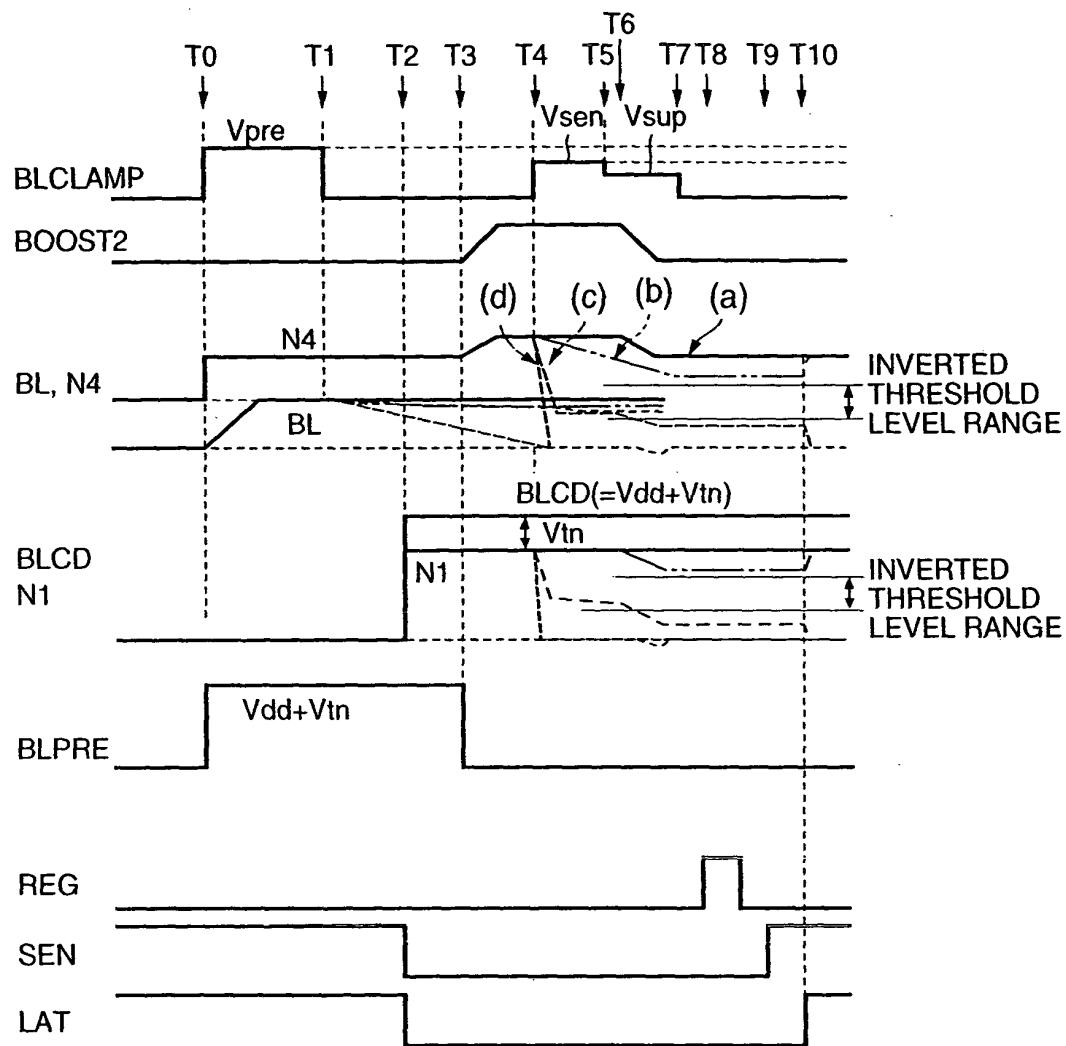


FIG.62

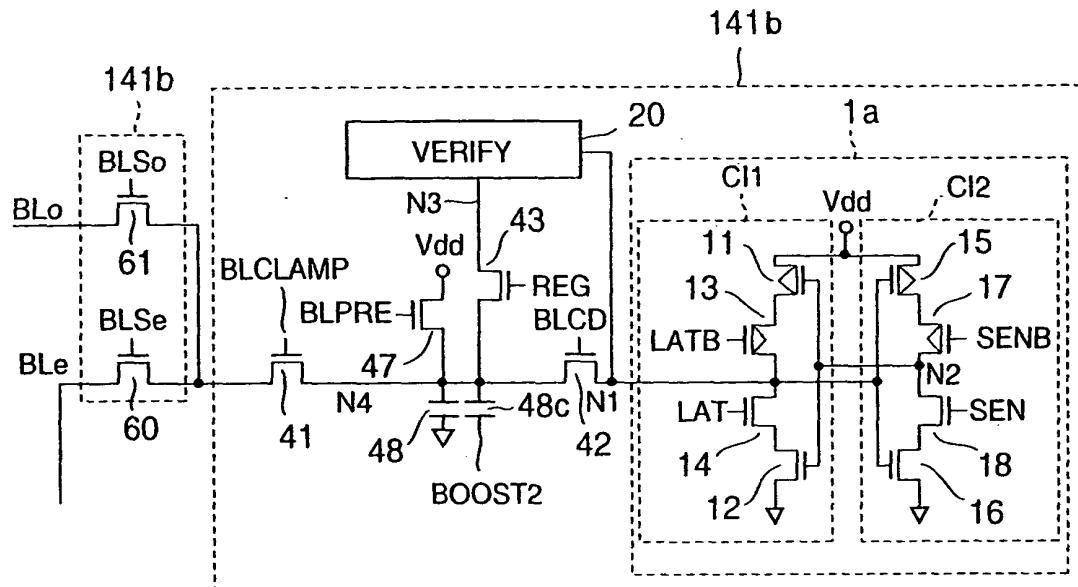


FIG.63

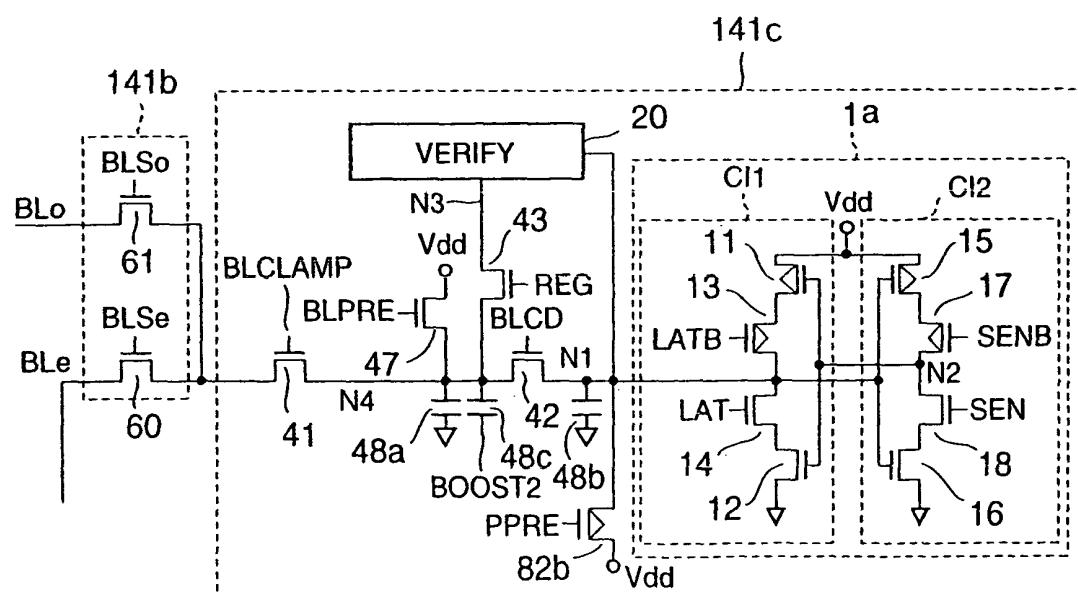


FIG. 64

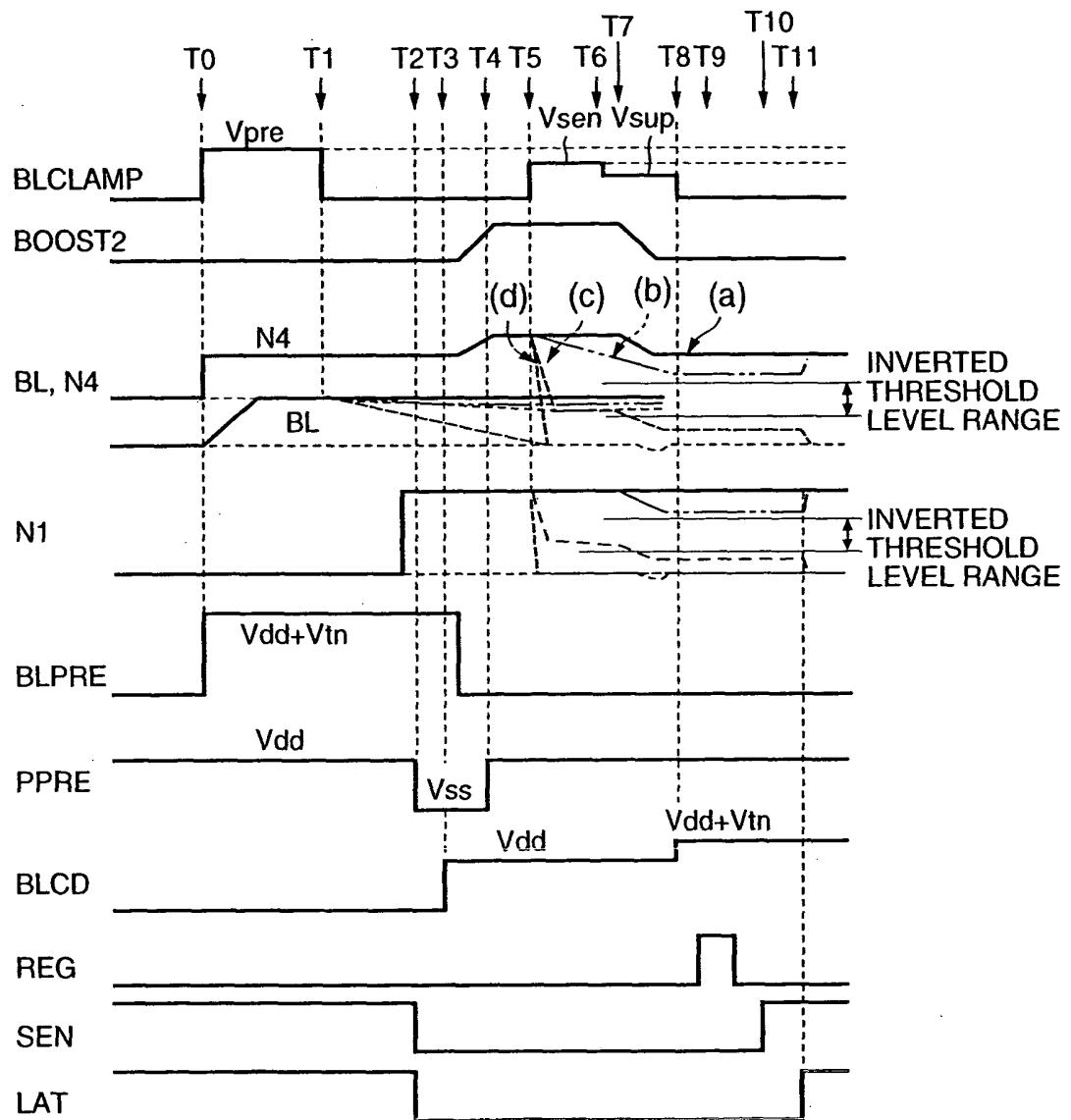


FIG.65

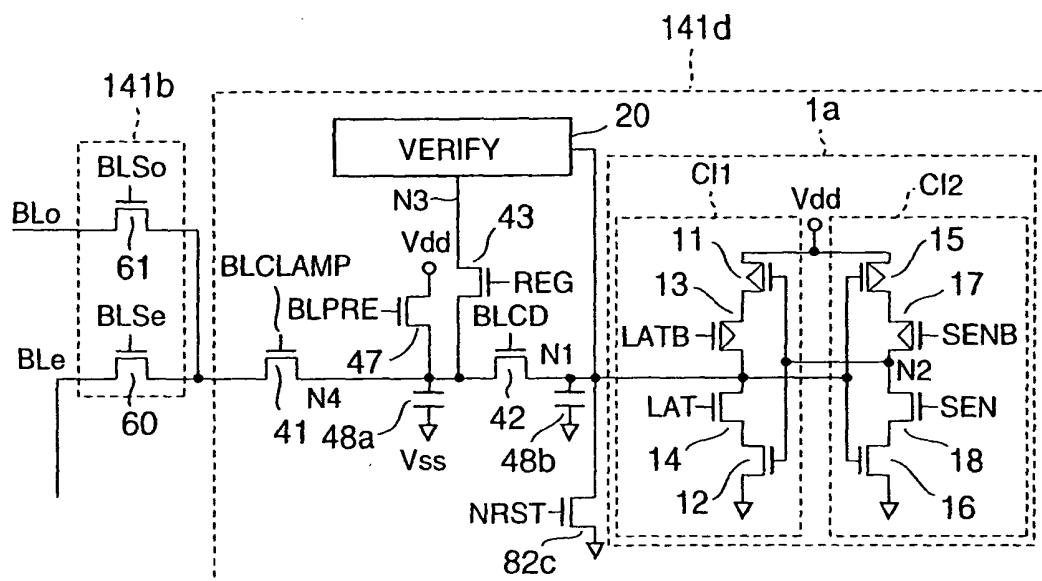


FIG.66

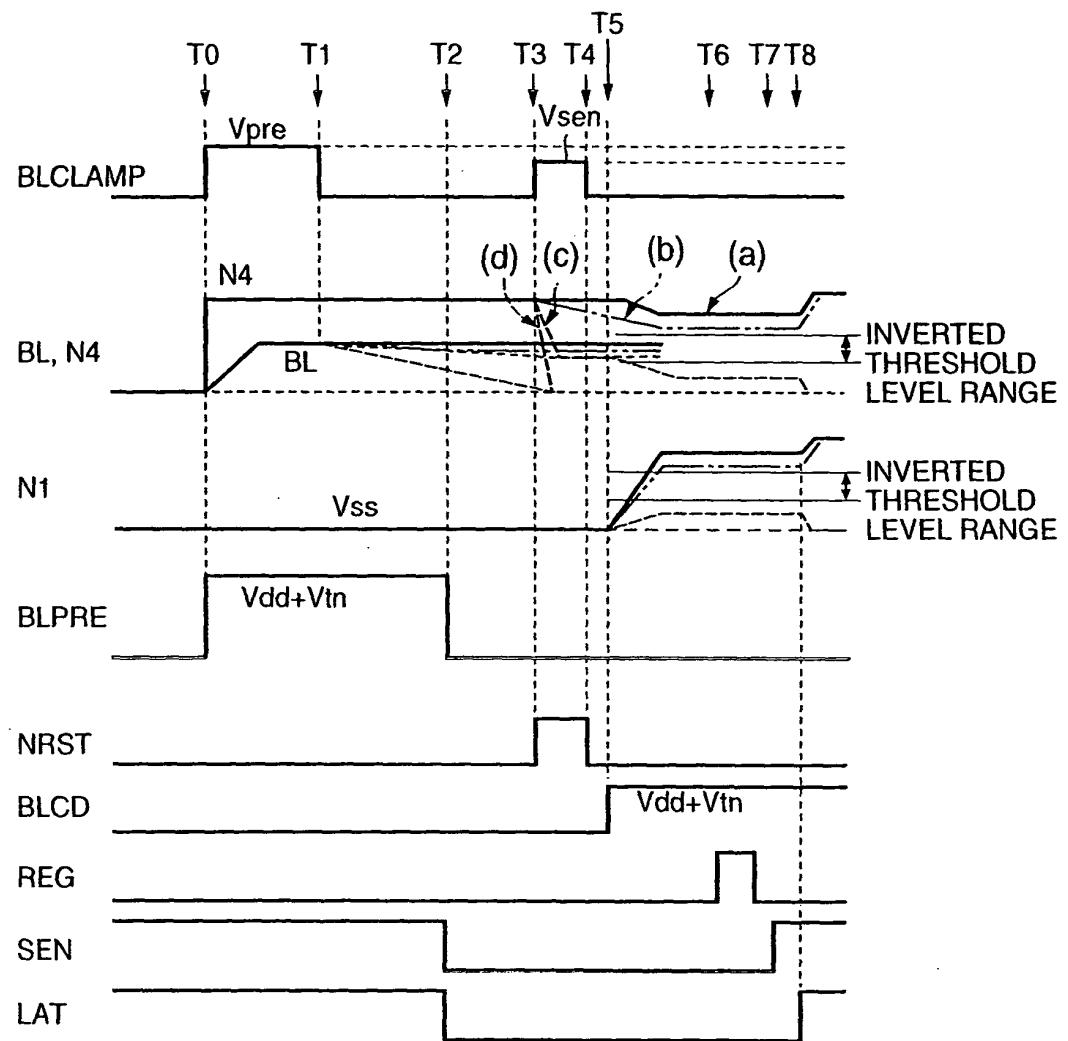


FIG.67

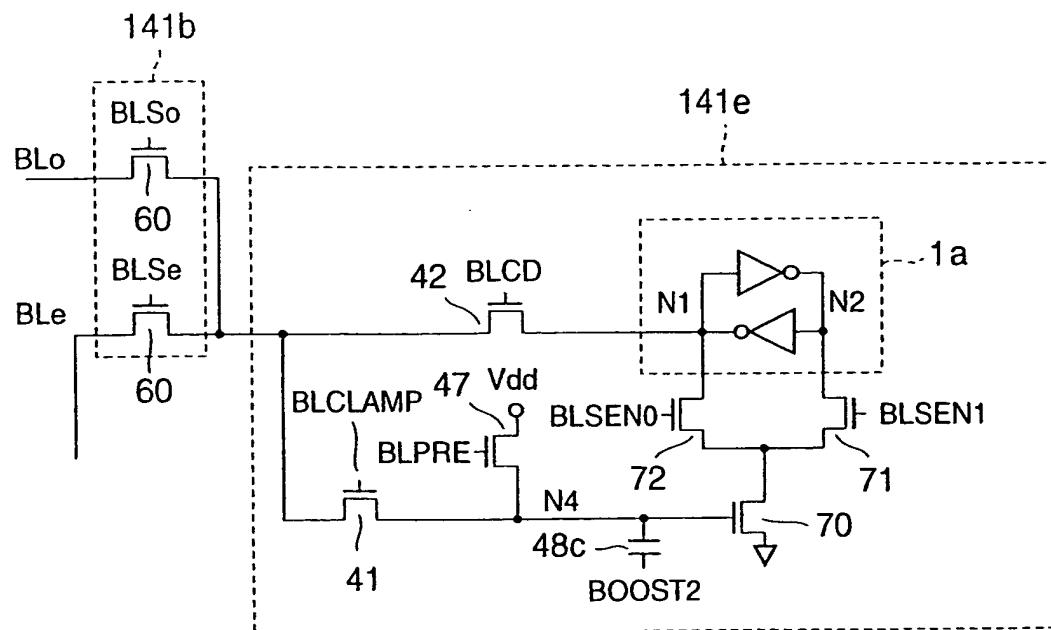


FIG.68

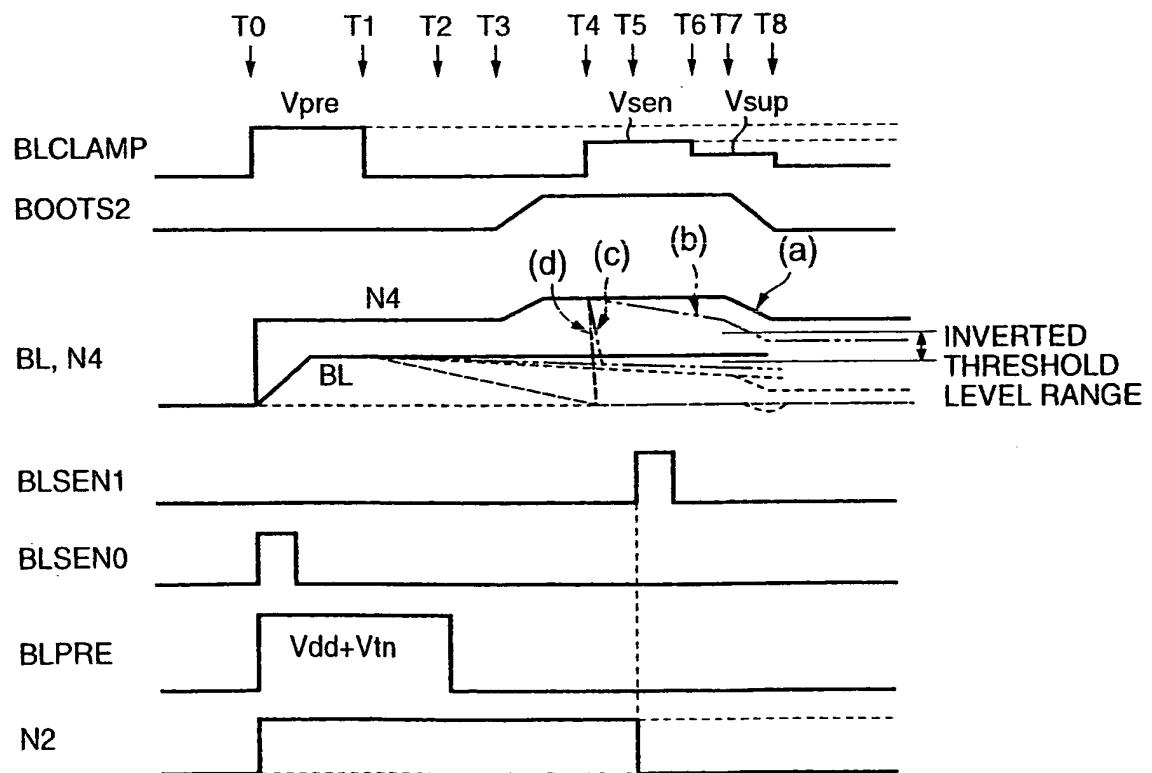
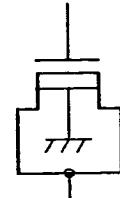


FIG. 69

N1, N4



BOOTS2

FIG.70A

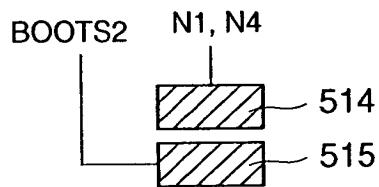


FIG.70B

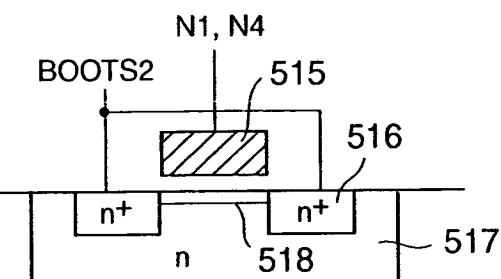


FIG.70C